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EXPERIMENTAL PRESSURE DISTRIBUTIONS  
ON A  $120^\circ$  CONE AT MACH NUMBERS  
FROM 2.96 TO 4.63 AND  
ANGLES OF ATTACK FROM  $0^\circ$  TO  $20^\circ$

by Robert L. Stallings, Jr., and Dorothy H. Tudor

Langley Research Center

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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SUMMARY

Pressure distributions have been experimentally determined on both a sharp and a blunt 120° cone configuration. The blunt-cone configuration consisted of a spherical segment which had a radius of 1/8 the base diameter and which faired into a 120° cone frustum. The tests were conducted at Mach numbers of 2.96, 3.95, and 4.63 over a range of angles of attack from 0° to 20°.

Pressure distributions and shock shapes obtained on both the sharp and blunt cones at an angle of attack ( $\alpha$ ) of 0° were in good agreement with an approximate theoretical solution based on the one-strip method of integral relations. Mach number had no effect on pressure distributions expressed in the form of local measured pressures divided by the free-stream pitot pressure ( $p_l/p_{t,2}$ ) for either the sharp or blunt configurations at  $\alpha = 0^\circ$ . At  $\alpha > 0^\circ$ , the Mach number effect was confined to the leeward side of both configurations and consisted of a decrease in  $p_l/p_{t,2}$  with increasing Mach number. The measured pressure distributions on the cone frustum of the blunt configuration were essentially the same as those obtained within the same region on the sharp-cone configuration throughout the range of test variables of this investigation.

An approximate technique involving a tangent-cone concept is presented for predicting the windward and leeward pressures for  $\alpha > 0^\circ$ . Results from this method are in fair agreement with experimental results both in the form of pressure distributions and force coefficients. For  $\alpha > 0^\circ$ , the local pressures around the circumference of both the sharp- and blunt-cone configurations, nondimensionalized by the pressure measured along the windward ray, were in good agreement with an empirically derived second-order polynomial. Force and moment coefficients obtained from integrated pressure measurements along the windward and leeward meridians together with this empirical equation for the circumferential distributions were in excellent agreement with balance measurements.

## INTRODUCTION

The use of unmanned probes for exploring low-density planetary atmospheres, such as that of Mars, has recently stimulated interest in the aerodynamics of vehicles with a low ballistic coefficient. A configuration satisfying this requirement and one that is being considered for such missions is a 120° cone. Since the bow shock for a 120° cone is detached for all Mach numbers, the governing partial differential equations for the flow field are of the elliptic type, and no exact analytical solutions are yet available. Several experimental investigations have been conducted to determine the aerodynamic characteristics of such a cone (see refs. 1 to 4); however, very little experimental pressure data exist that enable determination in detail of the local flow properties. Such flow properties are required in order that the designer might determine local aerodynamic heating rates and local structural loading.

The purpose of this investigation was to experimentally determine detailed pressure distributions over a 120° cone through a range of angles of attack from 0° to 20° and Mach numbers from 2.96 to 4.63. The model had interchangeable nose tips and the ratios of nose radius to afterbody radius were 0 and 0.25.

## SYMBOLS

$C_A$	forebody axial-force coefficient, $\frac{\text{Forebody axial force}}{\pi q_\infty r_b^2}$
$C_m$	pitching-moment coefficient, $\frac{\text{Pitching moment}}{2\pi q_\infty r_b^3}$
$C_N$	normal-force coefficient, $\frac{\text{Normal force}}{\pi q_\infty r_b^2}$
$C_p$	pressure coefficient, $\frac{p_l - p_\infty}{q_\infty}$
$C_{p,b}$	base pressure coefficient, $\frac{p_b - p_\infty}{q_\infty}$
$d$	base diameter
$l$	axial length of cone
$M_l$	local Mach number at outer edge of boundary layer
$M_\infty$	free-stream Mach number

$p_b$	base pressure
$p_L$	local static pressure along leeward meridian ( $\theta = 0^\circ$ ; $\phi = 0^\circ$ )
$p_l$	local static pressure
$p_t$	free-stream stagnation pressure
$p_{t,2}$	stagnation pressure behind normal shock
$p_W$	local static pressure along windward meridian ( $\theta = 180^\circ$ ; $\phi = 0^\circ$ )
$p_\infty$	free-stream static pressure
$q_\infty$	free-stream dynamic pressure
$r$	radial distance from axis of symmetry
$r_b$	base radius
$r_n$	nose radius
$s$	surface length (see fig. 1)
$s'$	surface length from most forward station on model to shoulder corner
$(\frac{s}{s'})_{s.p.}$	nondimensionalized stagnation-point location
$x$	axial distance from most forward station on model (see fig. 1)
$\alpha$	angle of attack
$\eta$	nondimensionalized angle of attack, $\frac{\alpha}{90^\circ - \sigma_c}$
$\theta$	meridian angle (see fig. 1)
$\theta_f$	final circumferential integration limit
$\theta_i$	initial circumferential integration limit

$\sigma_c$	cone semiapex angle
$\sigma_{c,e}$	equivalent cone semiapex angle
$\phi$	roll angle (see fig. 1)

## APPARATUS AND TEST CONDITIONS

### Wind Tunnel

This investigation was conducted in the high Mach number test section of the Langley Unitary Plan wind tunnel described in reference 5. This variable-pressure, continuous-flow tunnel has an asymmetric sliding-block nozzle that permits a continuous variation in the test-section Mach number from 2.30 to 4.63.

### Models and Instrumentation

The  $120^{\circ}$  cone model was constructed of aluminum and had interchangeable nose tips, as illustrated in figure 1, such that pressure distributions could be obtained for both a blunt cone and a sharp cone with minimum time required for model change. The base diameter of the model was 8.0 inches (203.2 mm) and the nose radius of the blunt cone was 1.0 inch (25.4 mm). The sting used had a diameter of 1.50 inches (38.1 mm) and was 31.0 inches (787.4 mm) in length.

The cone frustum was instrumented with 58 pressure orifices of 0.050-inch (1.27-mm) internal diameter, located as shown in figure 1. The blunt nose tip, which was a spherical segment, was instrumented with five orifices, orifice 1 being located at the axis of symmetry. The sharp nose tip was instrumented with only four orifices since one was not located at the stagnation point in order to retain a sharp apex. The pressure tubing from all orifices was routed through a slot in the sting assembly to minimize sting effects on the base-pressure measurements. A typical model installation in the test section is shown in figure 2.

Pressures were recorded by using three 48-channel pressure-sampling valves. Each valve sequentially transmits each channel of pressure information to a single electrical pressure transducer. This electrical information is fed to a strip-chart recorder and an analog-to-digital converter. The output in digital form is then recorded on punch-cards suitable for machine computation of final data. The tunnel stagnation pressure was measured with a precision mercury manometer.

### Accuracy

Accuracy of the pressure-sampling valves is better than 1 percent of the full-scale range of the gage; this includes all errors of linearity, hysteresis, and repeatability. Gages with a maximum range of 7.5 lb/in<sup>2</sup> (5.17 N/cm<sup>2</sup>) and 5.0 lb/in<sup>2</sup> (3.45 N/cm<sup>2</sup>) were used for orifices on the model nose and base, respectively. The accuracy of the precision mercury manometer with which the stagnation pressure was measured is 0.0035 lb/in<sup>2</sup> (0.0024 N/cm<sup>2</sup>).

The results of a test-section calibration indicate that the variation in a free-stream Mach number of 2.96 was  $\pm 0.02$ , of 3.95 was  $\pm 0.06$ , and of 4.63 was  $\pm 0.05$ .

### Test Conditions

This investigation was conducted at Mach numbers of 2.96, 3.95, and 4.63 for a nominal Reynolds number of  $2 \times 10^6$  based on model base diameter. Angle of attack was varied from 0° to 20° with an accuracy of  $\pm 0.1^\circ$  relative to the tunnel center line. The tunnel stagnation temperature was held constant at 610° R (339° K) for  $M_\infty = 2.96$  and at 635° R (353° K) for  $M_\infty = 3.95$  and 4.63.

## RESULTS AND DISCUSSION

A complete tabulation of the experimental data is presented in tables I to VI. Local flow properties included in this tabulation are pressures and Mach numbers.

### Pressures

Experimental forebody pressures.- Pressure distributions obtained through the ranges of angles of attack and Mach numbers are presented in figure 3 for the blunt cone at  $\phi = 0^\circ$ . The local measured pressures have been nondimensionalized by the free-stream pitot pressure and are plotted as a function of the ratio of local surface length to base diameter. For  $\alpha = 0^\circ$ , the experimental data are compared with an approximate theoretical solution obtained by using the one-strip method of integral relations as described in reference 6.

For all Mach numbers tested the experimental data as shown in figure 3 at  $\alpha = 0^\circ$  are in good agreement with the theoretical values. The maximum disagreement occurs in the vicinity of  $\frac{s}{d} = 0.45$  where the theoretical value is approximately 3 percent less than the experimental value. Increasing the angle of attack results in an increase in the pressures on the windward side of the model and a decrease on the leeward side, as would be expected. The stagnation point, as indicated by maximum pressure measurements, is located on the cone frustum ( $\frac{s}{d} > 0.065$ ) for  $\alpha \geq 10^\circ$  throughout the test range

of Mach numbers. For all angles of attack greater than  $0^\circ$ , the overexpanding flow on the leeward side of the spherical segment part of the nose results in pressures below those obtained on the forward part of the cone frustum. In this region an adverse pressure gradient, the magnitude of which increases with increasing angle of attack throughout the range of this investigation, occurs.

The results shown in figure 3 are replotted in figure 4 to more clearly illustrate the effect of Mach number. For  $\alpha = 0^\circ$  (fig. 4(a)) the variation in pressure with Mach number is negligible. This result should be expected since the sonic point is fixed at the sharp corner of the cone frustum for all test Mach numbers. For  $\alpha = 10^\circ$  (fig. 4(b)) and  $\alpha = 20^\circ$  (fig. 4(c)), the Mach number effect on the pressures is also negligible windward of the measured stagnation point. Leeward of the stagnation point a Mach number effect does occur which generally consists of a decrease in pressure with increasing Mach number. The magnitude of this effect increases with increasing  $\alpha$ .

Pressure distributions obtained for the blunt cone are compared with those obtained for the sharp cone in figure 5 in order to assess the extent of bluntness effects, the blunt-cone data being the same data shown previously in figure 4. For  $\alpha = 0^\circ$ , the pressure distributions on the two configurations are essentially the same although the pressures obtained for the sharp cone appear to be slightly greater than those for the blunt cone at the larger values of  $s/d$ . It should be noted that the values of  $s$  for orifices located on the cone frustum of the sharp cone are slightly greater than those for the same orifices on the blunt cone inasmuch as the surface length of the sharp cone tip is slightly greater (0.0053 inch (1.35 mm)) than that of the blunt cone tip. If a common coordinate system for the orifice locations on the cone frustum of the two configurations had been used, the measured pressures would have been even closer than indicated in figure 5. Pressure distributions obtained on the windward side of the two configurations for  $\alpha > 0^\circ$  indicate the same trends as shown for  $\alpha = 0^\circ$ . On the leeward side of the model, pressures associated with the flow expanding around the spherical nose segment of the blunt cone are somewhat lower than those obtained for the sharp cone. The pressures obtained downstream of the adverse pressure gradient occurring on the leeward side of the blunt cone are of approximately the same magnitude as those obtained for the sharp cone.

Analytical forebody pressures. - The pressure distributions for the sharp cone at angles of attack were approximated by a method similar to that suggested in reference 6 for blunt cones. The sharp cone was selected for this comparison since measured and empirical pressures will later be used for computing force coefficients and most of the large-angle-cone force measurements are for sharp cones. The method of reference 6 simply assumes that the windward pressures correspond to those for a tangent cone of angle  $\sigma_{c,e} = \sigma_c + \alpha$  and that the leeward pressures correspond to a tangent cone of angle  $\sigma_{c,e} = \sigma_c - \alpha$ . The one-strip method of integral relations is used to determine

the pressure distributions for the various cone angles  $\sigma_{c,e}$ . It was shown in reference 6 that better agreement with experimental data was obtained by shifting the stagnation point to the most forward point of the nose and forcing the sonic points to occur at the cone shoulder by a linear transformation. For a sharp cone this method indicates that the stagnation point would remain at the apex for angles of attack less than  $90^\circ - \sigma_c$  but, as shown in figure 5, this does not occur.

To more accurately define the stagnation-point locations, an attempt was made to correlate these locations for large-angle cones with other published data (ref. 4). One might expect the stagnation-point location for a cone at such an angle of attack that the windward surface is normal to the flow to be relatively insensitive to cone angle. Also, since at an angle of attack of  $0^\circ$  the stagnation point is located at the cone apex and independent of cone angle, a correlation parameter is suggested in the form of stagnation-point location  $s/s'$  as a function of a nondimensional angle of attack  $\eta$ . The experimental stagnation points for this investigation together with those of reference 4 were plotted in this form and, as shown in figure 6, a good correlation of these results is obtained through a wide range of test conditions. By using the method of least squares, a third-order polynomial was determined from these data points and the following equation resulted:

$$\left(\frac{s}{s'}\right)_{s.p.} = -0.399\eta^3 + 0.714\eta^2 + 0.174\eta \quad (1)$$

As shown in figure 6, a good approximation of the stagnation-point location is given by equation (1) for the range  $0 \leq \eta \leq 1$ . The validity of equation (1) for greater values of this parameter is questionable. These results are, of course, only applicable to large cone angles where detached flow occurs.

Analytical pressure distributions determined for the windward side of the sharp cone by using the tangent-cone concept together with measured stagnation-point locations are in good agreement with measured distributions as shown in figure 7, the maximum disagreement being less than 10 percent. The pressures between the measured stagnation point and cone apex are assumed to be their mirror image about the stagnation point. The pressure distributions over the leeward ray were approximated by the methods of references 6 and 7, the method used depending upon whether the shock wave for a cone angle equal to the leeward surface relative to the free-stream velocity vector was attached or detached. For a detached shock wave the pressures were calculated for a tangent cone from the method of reference 6 whereas if the shock wave was attached, the cone solutions of reference 7 were used. Also for this latter case, if the predicted conical pressure ratio  $p_l/p_{t,2}$  was greater than 0.5283, a linear expansion initiating at  $\frac{s}{s'} = 0.9$  to this value was assumed to occur. Results from this method are in fair agreement with experimental results, as shown in figure 7.

Circumferential pressure distributions, obtained by rolling the model at a constant angle of attack, are presented in figure 8 for the blunt cone at angles of attack of  $10^\circ$  and  $20^\circ$  and the three test Mach numbers. For simplification, these data are presented as a function of  $\theta$  only, that is, as if they had been obtained on a model with instrumentation located at each value of  $\theta$ . In the tables, however, the data are presented as they were actually tested, that is, as a function of both  $\phi$  and  $\theta$ .

The local measured pressures at a given value of  $\theta$  and  $s/d$  have been non-dimensionalized by the pressure along the windward ray ( $\theta = 180^\circ$ ) at the same value of  $s/d$ . In order to facilitate the use of these data for determining force coefficients, an attempt was made to fit a polynomial of the form

$$\frac{p_l}{p_W} = A \cos^2 \theta + B \cos \theta + C \quad (2)$$

to the data. The following conditions are assumed, the third condition being implied by the experimental results:

at  $\theta = 0^\circ$ ,

$$\frac{p_l}{p_W} = \frac{p_L}{p_W}$$

at  $\theta = 180^\circ$ ,

$$\frac{p_l}{p_W} = 1$$

and at  $\theta = 0^\circ$ ,

$$\frac{d^2}{d\theta^2} \left( \frac{p_l}{p_W} \right) = 0$$

Equation (2) then becomes

$$\frac{p_l}{p_W} = \frac{1}{4} \left( 1 - \frac{p_L}{p_W} \right) (\cos^2 \theta - 2 \cos \theta - 3) + 1 \quad (3)$$

As shown in figure 8 good approximations of the circumferential pressure distributions are obtained by using equation (3) through the range of test variables.

Base pressures.- Pressure coefficients obtained on the base of the blunt cone at  $\alpha = 0^\circ$  are presented in figure 9 as a function of radial distance from the axis of symmetry. These measurements are compared with the empirical relation

$$C_{p,b} = - \frac{1}{M_\infty^2} \quad (4)$$

which, as discussed in reference 8, gives a good approximation of the base pressures for a hemisphere-cylinder configuration within the test range of Mach numbers of this

investigation. The values of  $C_{p,b}$  determined from equation (4) are generally less than the measured values of this investigation (see fig. 9); however, this difference is within the accuracy of the pressure instrumentation. This inaccuracy is due to the very low pressures that occur in the base region. Increasing the angle of attack results in a slight increase in the base pressure coefficients as indicated in figure 10.

Circumferential base pressure distributions obtained by rolling the model are presented in figure 11 for both the sharp and blunt cones. The base pressures remain essentially constant with  $\theta$  even at an angle of attack of  $20^\circ$ . A comparison of the flagged and unflagged symbols also indicates that nose bluntness has no effect on the base pressures within the range of variables of this investigation.

### Schlieren Photographs

Schlieren photographs for both the blunt- and sharp-nose configurations at  $\alpha = 0^\circ$  are presented in figure 12 for the test range of Mach number. Measured shock shapes from these schlieren photographs are presented in figure 13 and are compared with theoretical shapes determined by the computer program described in reference 6. The theoretical shape for the sharp cone is actually based on a cone with  $r_n = 0.020$  inch (0.51 mm); however, as discussed in reference 6, this small nose radius gives a good approximation for the sharp-nose cone with a detached shock wave. The theoretical shock shapes are generally in good agreement with the experimental shapes for both configurations. For  $M_\infty = 2.96$ , the theoretical shock position is slightly closer to the body than that obtained experimentally for both configurations.

Schlieren photographs for both the sharp and blunt cones are presented in figure 14 for angles of attack up to  $20^\circ$ .

### Force Coefficients

As a result of the partially successful attempt to predict pressure distributions over a  $120^\circ$  cone both at  $\alpha = 0^\circ$  and at  $\alpha > 0^\circ$ , it was decided to explore further the validity of the method by comparing force coefficients determined from empirical pressure distributions with those obtained by force balance measurements. Since such force data are in the literature (ref. 9) for cone angles other than  $120^\circ$ , the accuracy of the method for different cone angles can also be assessed.

From reference 10 the equations for normal force, axial force, and pitching moment for a conic body can be written as

$$C_N = \frac{1}{\pi r_b^2} \int_0^l \int_{\theta_i}^{\theta_f} C_{px} \tan \sigma_c \cos \theta d\theta dx \quad (5)$$

$$C_A = \frac{1}{\pi r_b^2} \int_0^l \int_{\theta_i}^{\theta_f} C_p x \tan^2 \sigma_c d\theta dx \quad (6)$$

$$C_m = \frac{1}{2\pi r_b^3} \left[ \int_0^l \int_{\theta_i}^{\theta_f} C_p x (-l + x) \tan \sigma_c \cos \theta d\theta dx + \int_0^{-l} \int_{\theta_i}^{\theta_f} C_p x^2 \tan^3 \sigma_c \cos \theta d\theta dx \right] \quad (7)$$

By using the empirical relation, equation (3), to describe the circumferential pressure distributions, the force and moment coefficient equations after considerable rearranging can be written as

$$C_N = \frac{1}{2r_b^2} \frac{p_\infty}{q_\infty} \tan \sigma_c \cos^2 \sigma_c \int_0^{s'} s \left( \frac{p_W}{p_\infty} - \frac{p_L}{p_\infty} \right) ds \quad (8)$$

$$C_A = \frac{2}{r_b^2} \tan^2 \sigma_c \cos^2 \sigma_c \frac{p_\infty}{q_\infty} \int_0^{s'} s \left( 0.375 \frac{p_W}{p_\infty} + 0.625 \frac{p_L}{p_\infty} - 1 \right) ds \quad (9)$$

$$C_m = - \frac{1}{4r_b^3} \tan \sigma_c \cos^3 \sigma_c \frac{p_\infty}{q_\infty} \left[ \int_0^{s'} s(s' - s) \left( \frac{p_W}{p_\infty} - \frac{p_L}{p_\infty} \right) ds + \tan^2 \sigma_c \int_0^{s'} s^2 \left( \frac{p_W}{p_\infty} - \frac{p_L}{p_\infty} \right) ds \right] \quad (10)$$

A comparison of analytically and experimentally determined force and moment coefficients is presented in figure 15 for  $M_\infty = 4.63$ . The force and moment coefficients were determined from equations (8), (9), and (10) by using measured values of  $p_W$  and  $p_L$  (method 1) and by using the empirical values of  $p_W$  and  $p_L$  shown in figure 7 (method 2). The experimental data shown are balance measurements from reference 9. The axial force data from reference 9 have been adjusted to a base pressure coefficient corresponding to free-stream static pressure by using equation (4). The force coefficients obtained by method 1 are in excellent agreement with the balance measurement data and those obtained by method 2 are in fair agreement with these data. However, the empirical values of method 2 indicate the possibility of an inflection point in the pitching-moment curve for  $5^\circ \leq \alpha \leq 10^\circ$  which is contrary to the trend shown for the balance measurements. This discrepancy is due to the fact that when  $\alpha$  increases from  $5^\circ$  to  $10^\circ$ , the tangent cone corresponding to the leeward surface goes from a detached shock condition to an attached shock condition; therefore, as discussed previously, a different theory is used to determine the empirical pressures for these two conditions. Since these theories are applied only as approximations, some discontinuity in slope would be expected.

In order to test the validity of applying the methods used herein to other large-angle cones, force coefficients were calculated from equations (8), (9), and (10) for cones with half-angles of  $50^\circ$ ,  $70^\circ$ , and  $80^\circ$  by using empirical pressure distributions based on the same methods used for computing the distributions shown in figure 7. These results are shown in figure 16 and are compared with the experimental values of reference 9. In general, fair agreement is obtained between the experimental and empirical values for all cone angles.

## CONCLUSIONS

Pressure distributions have been experimentally determined on both a sharp and a blunt  $120^\circ$  cone configuration. The blunt-cone configuration consisted of a spherical segment which had a radius  $1/8$  of the base diameter and which faired into a  $120^\circ$  cone frustum. The tests were conducted at Mach numbers of 2.96, 3.95, and 4.63 over a range of angles of attack from  $0^\circ$  to  $20^\circ$ . The results are summarized as follows:

1. Pressure distributions and shock shapes obtained on both the sharp and blunt cones at an angle of attack ( $\alpha$ ) of  $0^\circ$  were in good agreement with an approximate theoretical solution based on the one-strip method of integral relations.
2. Mach number had no effect on pressure distributions expressed in the form of local measured pressures divided by the free-stream pitot pressure ( $p_l/p_{t,2}$ ) for either the sharp or blunt configurations at  $\alpha = 0^\circ$ . At  $\alpha > 0^\circ$ , the Mach number effect was confined to the leeward side of both configurations and consisted of a decrease in  $p_l/p_{t,2}$  with increasing Mach number.
3. The measured pressure distributions on the cone frustum of the blunt configuration were essentially the same as those obtained within the same region on the sharp-cone configuration throughout the range of test variables of this investigation.
4. A correlation parameter is presented which successfully correlates the stagnation-point locations for the bodies of this investigation with other existing results for a wide range of Mach numbers, bluntness, cone angle, angle of attack, and free-stream test conditions.
5. An approximate technique involving a tangent-cone concept is presented for predicting the windward and leeward pressures for  $\alpha > 0^\circ$ . Results from this method are in fair agreement with experimental results both in the form of pressure distributions and force coefficients.
6. For  $\alpha > 0^\circ$ , the local pressures around the circumference of both the sharp- and blunt-cone configurations, nondimensionalized by the pressure measured along the windward ray, were in good agreement with an empirically derived second-order

polynomial. Force and moment coefficients obtained from integrated pressure measurements along the windward and leeward meridians together with this empirical equation for the circumferential distributions were in excellent agreement with balance measurements.

7. Nose bluntness had no effect on measured base pressure coefficients ( $C_{p,b}$ ). These coefficients were in fair agreement with the empirical relation  $C_{p,b} = -\frac{1}{M_\infty^2}$  (where  $M_\infty$  is the free-stream Mach number) throughout the range of variables of this investigation.

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124-07-02-44-23.

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TABLE I.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 2.96$ (a)  $\alpha = 0^\circ$ 

Orifice	$\theta$ , deg	s, in.	s/d	$\phi = 0.0^\circ$ , $p_t = 3254.3$ psf					$\phi = 22.5^\circ$ , $p_t = 3256.0$ psf					$\phi = 45.0^\circ$ , $p_t = 3256.4$ psf				
				$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$
1	0	.000	.000	1101.3	1.745	.99589	11.70530	.07669	1100.1	1.742	.99429	11.68646	.09047	1101.3	1.744	.99527	11.69800	.08230
2	0	.200	.025	1092.9	1.731	.98831	11.61614	.12973	1091.7	1.728	.98671	11.59734	.13839	1094.1	1.732	.98877	11.62155	.12713
3	0	.400	.050	1087.1	1.687	.96555	11.34866	.22435	1067.7	1.686	.96505	11.34274	.22402	1070.1	1.690	.98709	11.36669	.21918
4	0	.600	.075	1055.7	1.667	.95471	11.22129	.25816	1054.5	1.664	.95313	11.20270	.24262	1056.9	1.667	.95516	11.22652	.25685
5	0	.800	.100	1035.1	1.650	.94625	11.1940	.28241	1044.9	1.647	.94467	11.16086	.28886	1046.1	1.649	.94540	11.11183	.26435
6	0	1.000	.125	1035.4	1.631	.92629	11.10476	.30411	1033.8	1.626	.93364	10.97356	.31475	1036.5	1.632	.93673	11.00989	.30700
7	0	1.200	.150	1023.4	1.611	.92546	10.99339	.33552	1023.3	1.610	.92497	10.47171	.33966	1025.7	1.613	.92897	10.89520	.33093
8	0	1.400	.175	1015.0	1.596	.91787	10.78823	.36508	1014.8	1.593	.91591	10.76987	.35582	1015.1	1.597	.91830	10.9328	.35168
9	0	1.600	.200	1006.6	1.581	.91028	10.69908	.36992	1006.6	1.581	.90981	10.64349	.36996	1007.7	1.582	.91031	10.77480	.36799
10	0	1.800	.225	997.0	1.565	.90161	10.59718	.39751	997.0	1.564	.90114	10.50155	.39850	999.3	1.568	.90312	10.61880	.36333
11	0	2.000	.250	988.6	1.550	.89403	10.50802	.41325	988.6	1.549	.89356	10.50233	.41421	990.9	1.553	.89553	10.52566	.30117
12	0	2.200	.275	981.4	1.538	.88753	10.43160	.41640	980.2	1.536	.88598	10.41342	.41949	982.5	1.539	.88794	10.43645	.41558
13	0	2.400	.300	971.8	1.521	.87886	10.39770	.42350	970.7	1.518	.87732	10.31588	.43649	972.9	1.522	.87927	10.34351	.42370
14	0	2.600	.325	961.1	1.503	.86910	10.21507	.45220	962.3	1.504	.86897	10.22247	.45101	963.3	1.505	.87059	10.23257	.44938
15	0	2.800	.350	951.6	1.486	.86044	10.11317	.48482	952.7	1.487	.86107	10.17062	.46725	955.2	1.487	.86084	10.17788	.47668
16	0	3.000	.375	938.3	1.463	.84851	9.97307	.49017	934.3	1.462	.84807	9.97686	.4996	940.5	1.466	.84999	9.99045	.48750
17	0	3.200	.400	925.1	1.440	.83659	9.83296	.51136	925.1	1.439	.83614	9.82783	.51213	927.3	1.443	.83807	9.85028	.50977
18	0	3.400	.425	911.9	1.417	.82467	9.69285	.52028	910.7	1.414	.82316	9.67506	.53468	912.9	1.418	.82506	9.69737	.53142
19	0	3.600	.450	895.2	1.388	.80950	9.51453	.55786	895.2	1.387	.80894	9.50957	.55857	897.4	1.391	.81096	9.53171	.55540
20	0	3.800	.475	874.8	1.353	.79108	9.29801	.58844	873.6	1.350	.78954	9.20402	.59089	875.8	1.354	.79145	9.30233	.58783
21	0	4.000	.500	852.0	1.314	.77049	9.05600	.62185	850.8	1.311	.76901	9.03854	.62423	853.0	1.314	.77085	9.06022	.62127
22	0	4.200	.525	806.5	1.235	.72931	8.57200	.66965	805.3	1.232	.72785	8.55479	.68923	808.6	1.237	.73073	8.58873	.68472
23	0	4.400	.550	791.8	1.222	.67079	7.84420	.77732	783.2	1.116	.66719	7.84189	.78285	741.4	1.121	.67002	7.87513	.77851
24	180	.200	.025	1092.9	1.731	.98836	11.61676	.12943	1093.0	1.730	.98786	11.61086	.13222	1091.7	1.728	.98664	11.59649	.13877
25	180	.400	.050	1057.7	1.687	.96550	11.34809	.22451	1067.6	1.686	.96499	11.34203	.22622	1066.5	1.684	.96379	11.32799	.23014
26	180	.600	.075	1054.4	1.664	.95353	11.20736	.26162	1054.4	1.663	.95301	11.20121	.26131	1053.2	1.661	.95183	11.18735	.24652
27	180	.800	.100	1043.6	1.644	.94371	11.09222	.28882	1043.5	1.645	.94320	11.08600	.29023	1042.4	1.642	.94204	11.07228	.29331
28	180	1.000	.125	1032.8	1.627	.93944	10.97707	.31400	1032.7	1.626	.93940	10.97079	.31533	1031.6	1.624	.93225	10.94721	.31118
29	180	1.200	.150	1021.3	1.610	.92632	10.87852	.33248	1024.3	1.611	.92578	10.84118	.33376	1023.1	1.609	.92463	10.84771	.33646
30	180	1.400	.175	1003.9	1.597	.90781	10.67002	.37474	1003.8	1.576	.90726	10.66355	.37548	1003.9	1.576	.90723	10.66314	.37556
31	180	1.600	.200	995.5	1.582	.89019	10.50407	.39056	996.6	1.563	.89071	10.48674	.39438	995.4	1.561	.89661	10.57364	.39110
32	180	1.800	.225	984.6	1.543	.89040	10.44632	.41104	985.6	1.544	.89092	10.44713	.40957	985.8	1.544	.89091	10.47136	.40910
33	180	2.000	.250	984.6	1.520	.88495	10.30135	.44253	978.7	1.520	.88495	10.40753	.42048	978.6	1.532	.88849	10.44555	.44266
34	180	2.200	.275	978.6	1.503	.88495	10.20221	.44275	968.4	1.515	.87566	10.20221	.41666	960.1	1.515	.87568	10.20236	.44965
35	180	2.400	.300	966.6	1.512	.87407	10.12421	.44275	968.4	1.515	.86587	10.17410	.46466	959.0	1.514	.86480	10.14451	.46430
36	180	2.600	.325	955.7	1.493	.86427	10.15827	.46129	959.0	1.492	.85607	10.16189	.47645	946.1	1.476	.85501	10.04944	.47839
37	180	2.800	.350	946.1	1.477	.85556	10.05592	.47738	947.1	1.478	.84618	10.03189	.49387	943.5	1.485	.84631	9.94715	.44012
38	180	3.000	.375	934.1	1.456	.84648	9.92798	.49704	931.1	1.457	.84518	9.92397	.49415	936.5	1.459	.84631	9.81930	.51340
39	180	3.200	.400	923.2	1.437	.83498	9.81284	.51436	924.3	1.438	.83538	9.81866	.51349	924.4	1.439	.83543	9.81930	.51340
40	180	3.400	.425	905.2	1.406	.81855	9.62093	.54255	906.2	1.407	.81904	9.62664	.54172	908.8	1.411	.82129	9.65308	.53788
41	180	3.600	.450	888.3	1.376	.80332	9.44182	.58921	890.5	1.379	.80488	9.44022	.56560	891.9	1.382	.80606	9.47409	.56363
42	180	3.800	.475	870.3	1.345	.78699	9.24991	.59513	871.9	1.346	.78746	9.25540	.59437	872.7	1.348	.78866	9.24952	.59241
43	180	4.000	.500	865.0	1.301	.77413	9.08124	.63203	864.7	1.300	.78349	9.07377	.63035	868.6	1.307	.76690	9.01381	.62760
44	180	4.200	.525	795.6	1.216	.71950	8.45670	.70222	796.5	1.217	.71993	8.46172	.70155	800.4	1.223	.72339	8.50239	.69617
45	180	4.400	.550	555.0	1.122	.70525	7.80908	.77775	741.1	1.121	.66983	7.87285	.77881	742.7	1.123	.76117	7.88868	.77674
46	90	1.000	.125	1036.4	1.633	.93738	11.01750	.30536	1035.6	1.630	.93580	10.99902	.30934	1037.7	1.634	.93781	11.02263	.30425
47	90	2.000	.250	991.0	1.554	.89620	10.53349	.39480	990.1	1.554	.89573	10.52799	.39977	999.9	1.553	.89553	10.52566	.40017
48	90	3.000	.375	940.7	1.467	.85068	9.98954	.48626	939.5	1.464	.84915	9.98059	.48901	939.3	1.464	.84891	9.97771	.48945
49	90	4.000	.500	849.4	1.309	.76832	9.03053	.62532	849.6	1.309	.76792	9.02581	.62597	848.7	1.306	.76651	9.00925	.62822
50	270	1.000	.125	1035.2	1.631	.93611	11.02666	.30456	1035.1	1.630	.93554	10.99639	.30990	1035.2	1.630	.93551	10.99557	.31008
51	270	2.000	.250	999.4	1.557	.89475	10.51650	.46178	989.3	1.551	.89419	10.45994	.40292	988.2	1.548	.89309	10.49693	.40518
52	270	3.000	.375	937.7	1.462	.84794	9.94636	.49119	937.5	1.461	.84736	9.94948	.49224	936.5	1.459	.84631	9.94715	.49412
53	270	4.000	.500	847.4	1.306	.76631	9.00683	.62855	847.1	1.304	.75567	8.99937	.62957	846.2	1.302	.76472	8.98824	.63108
54	0	4.877	.610	36.4	.100	.03295	.38779	2.87345	36.3	.100	.03281	.38567	2.87622	36.6	.100	.03310	.38900	2.87055
55	0	5.452	.529	32.9	.106	.02979	.15008	2.94021	32.6	.107	.02950	.34676						

TABLE I.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 2.96$  - Continued(a)  $\alpha = 0^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ$ , $p_t = 3258.6$ psf					$\phi = 90.0^\circ$ , $p_t = 3258.2$ psf					
			$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	
1	0	.000	.000	1100.1	1.741	.99350	11.67713	.09658	1101.3	1.743	.99470	11.69129	.08714
2	0	.200	.025	1092.9	1.728	.98700	11.60081	.13683	1092.9	1.729	.98713	11.60223	.13618
3	0	.400	.050	1069.9	1.687	.96536	11.36461	.22499	1070.1	1.689	.96656	11.36052	.22096
4	0	.600	.075	1055.7	1.664	.95345	11.20648	.26183	1056.9	1.666	.95465	11.22058	.25833
5	0	.800	.100	1046.1	1.648	.94480	11.10472	.28598	1046.1	1.648	.94491	11.10609	.28567
6	0	1.000	.125	1036.6	1.631	.93614	11.00296	.30849	1036.6	1.631	.93625	11.00431	.30820
7	0	1.200	.150	1025.9	1.612	.92640	10.88848	.33229	1025.9	1.613	.92651	10.88982	.33202
8	0	1.400	.175	1017.4	1.598	.91882	10.79944	.34989	1017.4	1.598	.91894	10.80076	.34963
9	0	1.600	.200	1007.8	1.581	.91017	10.69768	.36918	1009.0	1.583	.91136	10.71171	.36657
10	0	1.800	.225	999.4	1.567	.90259	10.60864	.38545	1000.6	1.569	.90378	10.62266	.38293
11	0	2.000	.250	991.0	1.552	.89501	10.51959	.40123	991.0	1.552	.89512	10.52089	.40101
12	0	2.200	.275	982.6	1.538	.88744	10.43055	.41658	982.6	1.538	.88755	10.43183	.41636
13	0	2.400	.300	974.2	1.523	.87986	10.34151	.43154	975.4	1.525	.88105	10.35550	.42921
14	0	2.600	.325	963.5	1.504	.87012	10.22703	.45028	964.7	1.507	.87131	10.24101	.44802
15	0	2.800	.350	952.7	1.486	.86038	10.11255	.46852	953.9	1.488	.86157	10.12651	.46532
16	0	3.000	.375	940.7	1.465	.84956	9.98535	.48828	941.9	1.467	.85075	9.99929	.48614
17	0	3.200	.400	927.5	1.442	.83766	9.84542	.50949	928.7	1.445	.83884	9.85936	.50740
18	0	3.400	.425	913.1	1.417	.82467	9.69278	.53209	915.5	1.422	.82693	9.71942	.52818
19	0	3.600	.450	897.6	1.390	.81060	9.52742	.55602	898.8	1.393	.81178	9.54131	.55403
20	0	3.800	.475	876.0	1.353	.79112	9.29846	.58837	877.2	1.355	.79230	9.31232	.58644
21	0	4.000	.500	853.2	1.314	.77056	9.05677	.62174	854.4	1.316	.77173	9.07061	.61985
22	0	4.200	.525	807.4	1.235	.72943	8.57341	.68676	810.1	1.239	.73169	8.59990	.68324
23	0	4.400	.550	741.8	1.121	.66991	7.87380	.77868	743.0	1.123	.67107	7.88748	.77890
24	180	.200	.025	1092.9	1.729	.98706	11.60143	.13655	1094.1	1.731	.98827	11.61564	.12996
25	180	.400	.050	1066.5	1.683	.96314	11.32034	.23232	1068.9	1.687	.96543	11.34729	.22474
26	180	.600	.075	1054.4	1.662	.95227	11.19257	.26525	1055.6	1.666	.95348	11.20673	.26177
27	180	.800	.100	1043.6	1.643	.94249	11.07758	.29213	1044.8	1.645	.94369	11.09172	.28894
28	180	1.000	.125	1034.0	1.626	.93379	10.97537	.31436	1034.0	1.627	.93391	10.97671	.31408
29	180	1.200	.150	1025.5	1.612	.92618	10.88593	.33280	1025.5	1.612	.92630	10.88726	.33253
30	180	1.400	.175	1014.7	1.593	.91640	10.77094	.35537	1014.7	1.593	.91651	10.77226	.35512
31	180	1.600	.200	1005.1	1.576	.90770	10.66872	.37453	1006.3	1.579	.90890	10.68281	.37194
32	180	1.800	.225	996.6	1.562	.90009	10.57928	.39701	997.8	1.564	.90129	10.59336	.38820
33	180	2.000	.250	987.0	1.545	.89140	10.47707	.40861	987.0	1.545	.89150	10.47835	.40839
34	180	2.200	.275	981.0	1.535	.88596	10.41318	.41953	982.2	1.537	.88716	10.42724	.41714
35	180	2.400	.300	969.0	1.514	.87509	10.25541	.44079	970.2	1.516	.87628	10.29945	.43848
36	180	2.600	.325	958.1	1.495	.86531	10.17042	.45935	959.3	1.498	.86650	10.18445	.45711
37	180	2.800	.350	948.5	1.479	.85661	10.04821	.47546	949.7	1.481	.85780	10.04222	.47328
38	180	3.000	.375	937.4	1.460	.84683	9.95321	.49320	938.9	1.462	.84802	9.96721	.49106
39	180	3.200	.400	926.8	1.441	.83704	9.83822	.51057	928.0	1.443	.83823	9.85221	.50848
40	180	3.400	.425	910.0	1.412	.82182	9.65934	.53697	911.2	1.414	.82301	9.67331	.53493
41	180	3.600	.450	894.3	1.385	.80769	9.49324	.56090	895.5	1.387	.80888	9.50719	.55891
42	180	3.800	.475	875.1	1.351	.79030	9.28881	.58972	876.3	1.354	.79149	9.30273	.58778
43	180	4.000	.500	849.8	1.308	.76747	9.02050	.62669	851.0	1.310	.76865	9.03438	.62480
44	180	4.200	.525	800.4	1.222	.72290	8.49665	.69693	802.9	1.227	.72516	8.52325	.69341
45	180	4.400	.550	745.1	1.126	.67289	7.90891	.77410	747.5	1.131	.76751	7.93544	.77063
46	90	1.000	.125	1035.4	1.629	.93506	10.99024	.31121	1035.4	1.629	.93517	10.99159	.31092
47	90	2.000	.250	989.8	1.550	.89393	10.56687	.40345	989.8	1.550	.89404	10.58116	.40323
48	90	3.000	.375	938.3	1.461	.84740	9.95991	.49218	937.1	1.459	.84642	9.94841	.49393
49	90	4.000	.500	847.2	1.303	.76514	8.99317	.63041	846.0	1.301	.76416	8.98155	.63199
50	270	1.000	.125	1036.4	1.631	.93597	11.00092	.30893	1036.4	1.631	.93608	11.00227	.30866
51	270	2.000	.250	988.2	1.547	.89248	10.44984	.40641	989.4	1.550	.89368	10.50391	.40397
52	270	3.000	.375	936.5	1.458	.84574	9.94044	.49515	937.7	1.460	.84693	9.95444	.49301
53	270	4.000	.500	843.8	1.297	.76203	8.95661	.63538	845.0	1.300	.76322	8.97049	.63349
54	0	4.877	.610	36.8	-.099	.03325	.39086	.286741	37.0	-.099	.03339	.39244	.286475
55	0	5.402	.675	33.3	-.105	.03009	.35364	.293352	33.6	-.105	.03037	.35692	.292741
56	0	5.927	.741	33.6	-.105	.03038	.35702	.292721	33.9	-.104	.03065	.36030	.292116
57	0	6.452	.807	33.6	-.105	.03038	.35702	.292721	33.6	-.105	.03037	.35692	.292741
58	0	6.977	.872	32.5	-.107	.02937	.34518	.294958	32.7	-.107	.02950	.34677	.294653
59	180	6.977	.872	31.6	-.108	.02850	.33502	.296960	31.7	-.108	.02864	.33662	.296225
60	180	6.452	.807	32.2	-.107	.02904	.34179	.295612	32.5	-.107	.02936	.34508	.294977
61	180	5.927	.741	31.2	-.109	.02822	.33164	.297616	31.4	-.109	.02835	.33324	.297296
62	180	5.402	.675	31.1	-.109	.02807	.32995	.297956	31.2	-.109	.02821	.33154	.297635
63	180	4.877	.610	31.7	-.108	.02865	.33672	.296606	31.9	-.108	.02878	.33831	.296229

\*The following conversion factors can be used to convert these data to the International System of Units:

$$1 \text{ inch} = 25.4 \text{ mm}; 1 \text{ psf} = 47.88 \text{ N/m}^2$$

TABLE I.—TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 2.96$  - Continued(b)  $\alpha = 10^\circ$ 

Orifice	$\theta$ , deg	s, in.	s/d	$\phi = 0.0^\circ$ , $p_t = 3256.7$ psf				$\phi = 22.5^\circ$ , $p_t = 3259.2$ psf				$\phi = 45.0^\circ$ , $p_t = 3255.3$ psf					
				$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$
1	0	.000	.000	1028.1	1.617	.92905	10.491968	.32595	1027.0	1.614	.92731	10.499919	.33012	1028.0	1.618	.92937	10.492336
2	0	.200	.025	974.1	1.524	.88027	10.346310	.43074	976.4	1.527	.88186	10.35504	.42762	984.8	1.543	.9033	10.46451
3	0	.400	.050	899.7	1.395	.81306	9.55631	.55187	904.3	1.409	.82019	9.64013	.53976	927.3	1.443	.83827	9.85270
4	0	.600	.075	912.9	1.118	.82498	9.49647	.53155	917.9	1.425	.82884	9.74187	.52488	929.7	1.448	.84044	9.87819
5	0	.800	.100	916.5	1.124	.82823	9.73470	.52594	915.5	1.421	.82664	9.71643	.52662	924.9	1.439	.83610	9.82720
6	0	1.000	.125	904.1	1.410	.82065	9.64550	.53398	907.1	1.407	.81911	9.62741	.54161	916.5	1.425	.82851	9.71798
7	0	1.200	.150	893.8	1.385	.80764	9.49260	.56099	897.6	1.390	.81045	9.52567	.55627	905.7	1.406	.81875	9.62327
8	0	1.400	.175	890.2	1.378	.80438	9.45438	.56643	891.6	1.380	.80504	9.46208	.56534	902.1	1.400	.81550	9.58503
9	0	1.600	.200	883.0	1.366	.79788	9.37793	.57723	885.6	1.369	.79963	9.39849	.57434	897.3	1.391	.81116	9.53404
10	0	1.800	.225	877.0	1.356	.79246	9.31422	.58617	878.4	1.357	.79314	9.32218	.58566	890.1	1.379	.80466	9.45757
11	0	2.000	.250	869.8	1.343	.78596	9.23777	.59682	872.4	1.347	.78873	9.25859	.59393	884.1	1.369	.79923	9.39384
12	0	2.200	.275	865.0	1.335	.78162	9.18680	.60324	867.6	1.334	.78340	9.20998	.60098	878.1	1.358	.79311	9.33011
13	0	2.400	.300	859.0	1.324	.77620	9.12309	.61245	869.4	1.324	.77691	9.13141	.61153	872.1	1.348	.78839	9.26638
14	0	2.600	.325	851.4	1.312	.76969	9.04664	.62312	855.6	1.312	.77251	9.05494	.61345	874.8	1.335	.79236	9.20440
15	0	2.800	.350	844.6	1.300	.76319	8.97019	.63553	859.0	1.301	.77526	9.07880	.62327	887.1	1.343	.79538	9.11124
16	0	3.000	.375	835.0	1.293	.75292	8.89506	.64735	834.1	1.286	.78664	9.05635	.64442	897.7	1.358	.79678	9.07420
17	0	3.200	.400	826.4	1.284	.74632	8.76432	.66103	826.9	1.268	.78461	9.77531	.65983	839.6	1.290	.75802	8.90949
18	0	3.400	.425	817.0	1.252	.73826	8.67713	.67296	818.5	1.253	.77933	8.66629	.67173	827.7	1.271	.74826	8.79477
19	0	3.600	.450	806.2	1.233	.72850	9.59246	.68821	805.3	1.230	.72713	9.54639	.69034	814.5	1.248	.73634	8.65457
20	0	3.800	.475	797.6	1.206	.71441	9.39681	.71012	799.7	1.203	.71307	9.3106	.71220	798.9	1.221	.72224	8.48887
21	0	4.000	.500	777.2	1.181	.70140	9.24391	.73024	774.1	1.177	.69900	9.21573	.73394	780.9	1.196	.70597	8.29768
22	0	4.200	.525	764.2	1.159	.68688	7.86166	.78027	741.8	1.121	.66979	7.87235	.77887	746.1	1.130	.67452	7.92800
23	0	4.400	.550	688.4	1.029	.62226	7.31376	.85193	690.2	1.031	.62324	7.32548	.85039	693.3	1.038	.62681	7.34722
24	180	.200	.025	1073.7	1.696	.97024	11.40372	.20821	1072.5	1.493	.96839	11.32025	.21470	1056.7	1.668	.95532	11.22846
25	180	.400	.050	1095.3	1.734	.99979	11.63359	.17115	1089.3	1.722	.98362	11.56109	.15376	1062.8	1.678	.96076	11.29240
26	180	.600	.075	1097.7	1.738	.99197	11.65913	.17074	1090.5	1.724	.98471	11.57388	.14851	1056.3	1.674	.95859	11.26683
27	180	.800	.100	1095.3	1.734	.99879	11.63359	.17115	1084.9	1.718	.98145	11.53551	.14378	1054.3	1.664	.95315	11.20289
28	180	1.000	.125	1091.7	1.728	.98653	11.59528	.17391	1080.9	1.707	.97601	11.47157	.16568	1049.3	1.653	.94771	11.13994
29	180	1.200	.150	1086.9	1.719	.99219	11.54240	.16044	1078.5	1.703	.97383	11.44599	.19050	1041.5	1.645	.94336	11.08778
30	180	1.400	.175	1079.7	1.707	.97567	11.46757	.18792	1070.1	1.689	.96622	11.35647	.22212	1037.5	1.634	.93792	11.02384
31	180	1.600	.200	1074.0	1.698	.97132	11.41649	.20430	1064.0	1.674	.96076	11.29252	.23916	1032.7	1.626	.93356	10.97267
32	180	1.800	.225	1064.9	1.688	.95849	11.35264	.22322	1058.0	1.668	.95533	11.22835	.25633	1026.6	1.616	.92159	10.93201
33	180	2.000	.250	1060.5	1.673	.95828	11.26325	.24748	1050.4	1.655	.94881	11.14446	.25156	1019.4	1.603	.91615	10.8307
34	180	2.200	.275	1054.5	1.663	.95245	11.19404	.25757	1044.4	1.644	.9427	10.97400	.26180	1013.4	1.593	.9165	10.7307
35	180	2.400	.300	1046.0	1.648	.94805	11.10251	.26447	1036.3	1.630	.93575	10.99838	.30497	1005.0	1.578	.90854	10.67855
36	180	2.600	.325	1040.4	1.634	.93744	11.09442	.30469	1027.7	1.614	.92704	10.86067	.33076	995.4	1.561	.89983	10.67624
37	180	2.800	.350	1026.2	1.619	.92094	11.01123	.32357	1018.2	1.599	.91943	10.69655	.34545	986.9	1.547	.89222	10.48672
38	180	3.000	.375	1017.2	1.598	.91917	10.46353	.34909	1007.4	1.580	.90964	10.69145	.37034	977.3	1.530	.88351	10.38441
39	180	3.200	.400	1005.2	1.578	.90931	10.47583	.37322	995.3	1.559	.89875	10.54356	.39350	966.5	1.511	.87372	10.26931
40	180	3.400	.425	990.7	1.553	.89527	10.52599	.40171	982.1	1.536	.88679	10.44288	.41786	950.8	1.484	.85957	10.10306
41	180	3.600	.450	973.9	1.523	.88006	10.34380	.41116	964.0	1.505	.87046	10.23105	.44963	935.2	1.457	.84543	9.91680
42	180	3.800	.475	952.3	1.488	.86050	10.11394	.46430	943.5	1.470	.85197	10.01364	.48393	914.7	1.422	.82693	9.71940
43	180	4.000	.500	924.6	1.438	.83551	9.92023	.51326	915.8	1.422	.82694	9.71950	.52817	888.2	1.376	.80299	9.43804
44	180	4.200	.525	878.1	1.351	.79898	9.24388	.59041	865.2	1.334	.78124	9.18237	.60449	840.1	1.292	.75947	8.92650
45	180	4.400	.550	806.8	1.234	.72904	8.56876	.67328	798.9	1.219	.72410	8.47898	.69297	716.3	1.182	.70180	8.24870
46	90	1.000	.963.9	1.514	.87593	.01306	.55531	.55187	866.4	1.336	.84399	9.91992	.49827	917.7	1.427	.82960	9.75073
47	90	2.000	.250	893.7	1.395	.87024	.01306	.56557	789.7	1.203	.71307	8.31016	.71220	776.1	1.182	.70163	8.24669
48	90	3.000	.375	899.7	1.395	.74042	.87028	.44744	870.2	1.191	.70298	10.77982	.36317	1051.9	1.659	.95097	11.17730
49	90	4.000	.500	819.4	1.256	.74042	.87028	.44744	851.0	1.186	.70298	10.42288	.41788	1019.4	1.603	.92159	10.83201
50	270	1.000	.125	966.7	1.511	.87354	10.24718	.44376	1011.0	1.586	.91290	10.77982	.36317	1051.9	1.659	.95097	11.17730
51	270	2.000	.250	937.8	1.461	.84746	9.94070	.49204	982.1	1.536	.88679	10.42288	.41788	1019.4	1.603	.92159	10.83201
52	270	3.000	.375	894.9	1.390	.81052	9.52652	.55615	934.7	1.461	.84761	9.96249	.49478	976.1	1.528	.88242	10.77162
53	270	4.000	.500	815.2	1.249	.73664	8.45815	.67549	887.7	1.309	.76846	9.04580	.54955	877.0	1.374	.81111	.94566
54	0	4.877	.610	33.4	-105	.03016	.35450	.293190	32.4	-107	.03042	.34957	.34580	2149.8	31.5	-110	.02947
55	0	5.442	.675	28.8	-113	.02600	.30555	.301080	27.1	-114	.02540	.29857	.30462	27.5	-115	.02488	.29423
56	0	5.927	.741	27.5	-115	.02405	.29204	.307281	26.9	-117	.02425	.29807	.307729	26.9	-116	.02430	.29561
57	0	6.452	.807	27.0	-116	.02424	.29203	.307281	26.9	-117	.02425	.29807	.307729	26.7	-117	.02416	.29392
58	0	6.977	.877	27.5	-116	.02470	.29036	.304496	26.9	-117	.02425	.29807	.307729	26.7	-117	.02401	.29223
59	180	6.977	.877	26.5	-117	.02399	.29192	.304477	26.4	-117	.02392	.29801	.304933				

TABLE 1.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_{\infty} = 2.96$  - Continued(b)  $\alpha = 10^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ$ , $p_t = 3258.6$ psf						$\phi = 90.0^\circ$ , $p_t = 3257.4$ psf					
			$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$		
1	0	.000	.000	1025.8	1.612	.92640	10.88848	.33229	1025.8	1.613	.92674	10.89249	.33148	
2	0	.200	.025	999.4	1.567	.90259	10.69864	.38545	1018.6	1.601	.92024	10.81614	.34664	
3	0	.400	.050	957.5	1.494	.86471	10.16343	.46047	993.4	1.557	.89751	10.54892	.39609	
4	0	.600	.075	951.5	1.484	.85930	10.09983	.47052	983.8	1.540	.88885	10.44712	.41375	
5	0	.800	.100	944.3	1.471	.85281	10.02351	.48240	977.8	1.530	.88343	10.38350	.42453	
6	0	1.000	.125	937.1	1.459	.84631	9.94719	.49412	970.7	1.518	.87694	10.30715	.43722	
7	0	1.200	.150	927.5	1.442	.83766	9.84652	.50949	961.1	1.501	.86828	10.20535	.45377	
8	0	1.400	.175	923.9	1.436	.83441	9.80726	.51519	958.7	1.497	.86611	10.17990	.45784	
9	0	1.600	.200	916.7	1.424	.82791	9.73094	.52649	951.5	1.484	.85962	10.10355	.46993	
10	0	1.800	.225	910.7	1.413	.82250	9.66734	.53580	945.5	1.474	.85420	10.03992	.47986	
11	0	2.000	.250	904.7	1.403	.81709	9.60374	.54504	938.3	1.462	.84771	9.96358	.49162	
12	0	2.200	.275	898.8	1.392	.81168	9.54014	.55419	933.5	1.453	.84338	9.91268	.49936	
13	0	2.400	.300	892.8	1.382	.80627	9.47654	.56328	926.3	1.441	.83688	9.83633	.51086	
14	0	2.600	.325	884.4	1.368	.79869	9.38750	.57589	919.1	1.428	.83039	9.75998	.52221	
15	0	2.800	.350	879.6	1.359	.79437	9.33662	.58304	909.5	1.412	.82172	9.65818	.53714	
16	0	3.000	.375	876.7	1.339	.78354	9.29092	.60075	901.1	1.397	.81415	9.56910	.55003	
17	0	3.200	.400	856.8	1.320	.77380	9.09493	.61652	888.0	1.374	.80224	9.42913	.57001	
18	0	3.400	.425	844.8	1.299	.76298	8.96773	.63387	876.0	1.354	.79141	9.30188	.58789	
19	0	3.600	.450	831.6	1.276	.75108	8.82781	.65277	861.6	1.329	.77842	9.14918	.60907	
20	0	3.800	.475	813.7	1.245	.73484	8.63701	.67830	842.4	1.296	.76110	8.94559	.63687	
21	0	4.000	.500	794.5	1.212	.71753	8.43348	.70528	820.9	1.258	.74161	8.71654	.66769	
22	0	4.200	.525	757.3	1.148	.68398	8.07916	.75707	781.3	1.190	.70588	8.29662	.72331	
23	0	4.400	.550	699.8	1.048	.63203	7.42859	.83687	717.8	1.080	.64850	7.62220	.81155	
24	180	.200	.025	1038.8	1.635	.93818	11.07696	.30331	1017.1	1.598	.91891	10.80047	.34969	
25	180	.400	.050	1030.4	1.620	.90308	10.93762	.32225	988.2	1.548	.89281	10.49371	.40574	
26	180	.600	.075	1020.8	1.604	.92189	10.83552	.34284	977.4	1.529	.88302	10.37867	.42534	
27	180	.800	.100	1013.6	1.591	.91538	10.75894	.35766	970.2	1.517	.87650	10.30198	.43807	
28	180	1.000	.125	1010.0	1.585	.91212	10.72065	.36489	965.4	1.508	.87215	10.25086	.44642	
29	180	1.200	.150	1004.0	1.575	.90669	10.65684	.37671	960.5	1.500	.86780	10.19973	.45467	
30	180	1.400	.175	997.9	1.564	.90126	10.59303	.38825	953.3	1.488	.86127	10.12304	.46686	
31	180	1.600	.200	990.7	1.552	.89475	10.51645	.41178	948.5	1.479	.85962	10.07191	.47489	
32	180	1.800	.225	985.9	1.543	.89040	10.46540	.41062	943.7	1.471	.85258	10.02079	.48282	
33	180	2.000	.250	977.5	1.529	.88280	10.37606	.42578	935.3	1.456	.84496	9.93132	.49653	
34	180	2.200	.275	973.9	1.523	.87954	10.33777	.42126	930.4	1.448	.84061	9.88019	.50427	
35	180	2.400	.300	964.3	1.504	.87086	10.23567	.44888	922.0	1.433	.83300	9.79072	.51765	
36	180	2.600	.325	959.5	1.491	.86326	10.14633	.46318	912.4	1.417	.82430	9.68847	.53272	
37	180	2.800	.350	947.4	1.477	.85566	10.05699	.47721	905.2	1.404	.81778	9.61178	.54388	
38	180	3.000	.375	939.0	1.462	.84805	9.96765	.49099	895.5	1.387	.80908	9.50952	.55858	
39	180	3.200	.400	928.2	1.443	.83828	9.85279	.50839	887.1	1.373	.80146	9.42005	.57129	
40	180	3.400	.425	913.8	1.418	.82525	9.69964	.53108	873.9	1.350	.78950	9.27945	.59102	
41	180	3.600	.450	898.1	1.391	.81114	9.53372	.55511	854.2	1.323	.77536	9.11329	.61400	
42	180	3.800	.475	880.1	1.360	.79485	9.34228	.58224	841.4	1.294	.76014	8.93435	.63839	
43	180	4.000	.500	853.7	1.314	.77096	9.06150	.62109	817.3	1.252	.73839	8.67872	.67274	
44	180	4.200	.525	808.0	1.235	.72970	8.57652	.68635	775.2	1.179	.70033	8.23136	.73189	
45	180	4.400	.550	749.1	1.133	.67649	7.95115	.76858	719.8	1.083	.65031	7.64341	.80878	
46	90	1.000	.125	907.1	1.407	.81926	9.42918	.54135	905.9	1.405	.81848	9.42000	.54268	
47	90	2.000	.250	873.6	1.349	.78985	9.27302	.59192	871.2	1.345	.78708	9.25098	.59499	
48	90	3.000	.375	837.6	1.287	.75649	8.89141	.64420	835.2	1.283	.75660	8.86924	.64719	
49	90	4.000	.500	770.5	1.171	.69588	8.17908	.73875	770.5	1.171	.69614	8.18209	.73835	
50	270	1.000	.125	1084.5	1.714	.97944	11.51194	.17251	1094.1	1.731	.98851	11.61849	.12860	
51	270	2.000	.250	1054.5	1.662	.95230	11.19287	.26517	1065.3	1.681	.95241	11.31173	.23460	
52	270	3.000	.375	1008.8	1.583	.91103	10.70789	.36728	1020.7	1.604	.92217	10.83881	.34219	
53	270	4.000	.500	917.4	1.425	.82851	9.73793	.52546	928.0	1.444	.83844	9.85463	.58111	
54	0	4.877	.610	30.4	-1.110	.02747	.32282	2.99410	30.3	-1.111	.02733	.32125	.299735	
55	0	5.402	.675	26.8	-1.117	.02416	.28395	3.07994	26.6	-1.117	.02402	.28236	.308371	
56	0	5.927	.741	26.4	-1.117	.02387	.28057	3.08799	26.3	-1.118	.02374	.27898	.309181	
57	0	6.452	.807	26.3	-1.118	.02373	.27888	3.09206	26.3	-1.118	.02374	.27898	.309181	
58	0	6.977	.872	26.3	-1.118	.02373	.27888	3.09206	26.1	-1.118	.02359	.27729	.309590	
59	180	6.977	.872	26.3	-1.118	.02373	.27888	3.09206	26.1	-1.118	.02359	.27729	.309590	
60	180	6.452	.807	26.4	-1.117	.02387	.28057	3.08799	26.3	-1.118	.02374	.27898	.309181	
61	180	5.927	.741	26.6	-1.117	.02401	.28226	3.08395	26.3	-1.118	.02374	.27898	.309181	
62	180	5.402	.675	26.8	-1.117	.02416	.29395	3.07994	26.3	-1.118	.02374	.27898	.309181	
63	180	4.877	.610	26.9	-1.116	.02430	.28564	3.07596	26.4	-1.117	.02388	.28067	.308774	

\*The following conversion factors can be used to convert these data to the International System of Units:

1 inch  $\square$  25.4 mm; 1 psf  $= 47.88 \text{ N/m}^2$ .

TABLE I.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_{\infty} = 2.96$  - Continued(c)  $\alpha = 20^\circ$ 

Orifice	$\theta, \text{deg}$	s, in.	s/d	$\phi = 0.0^\circ, p_t = 3258.7 \text{ psf}$					$\phi = 22.5^\circ, p_t = 3258.8 \text{ psf}$					$\phi = 45.0^\circ, p_t = 3256.9 \text{ psf}$				
				$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$
1	0	.000	.000	843.4	1.297	.76164	8.9195	.63601	841.2	1.293	.75969	8.92902	.63912	837.7	1.288	.75695	8.96688	.64346
2	0	.200	.025	67822	1.137	.74952	7.97144	.67852	7.97507	.76545	761.4	1.159	.68981	8.10774	.74809	8.10774	.74809	8.10774
3	0	.400	.050	594.0	.873	.54062	6.34523	.99007	613.5	.999	.55047	6.51234	.98456	656.7	.974	.59343	6.97495	.89661
4	0	.600	.075	669.0	.969	.58613	8.8996	.89002	659.1	.978	.59520	6.95957	.89387	6.014	.61401	7.21678	.86468	7.21678
5	0	.800	.100	714.2	1.076	.66680	7.40216	.81147	702.2	1.052	.63415	7.44537	.83360	693.9	1.039	.62700	7.36952	.84462
6	0	1.000	.125	714.4	1.068	.64246	7.55122	.82083	701.0	1.050	.63307	7.44085	.83527	697.5	1.045	.63025	7.40770	.83961
7	0	1.200	.150	695.8	1.041	.62334	7.34568	.84250	692.6	1.036	.62550	7.35182	.84694	692.7	1.036	.62592	7.35679	.84629
8	0	1.400	.175	698.2	1.045	.63055	7.41115	.83916	693.8	1.038	.62658	7.36454	.84527	696.3	1.043	.62917	7.39497	.84128
9	0	1.600	.200	694.6	1.039	.62729	7.37295	.84417	691.4	1.034	.62447	7.33910	.84861	693.9	1.039	.62700	7.36952	.84462
10	0	1.800	.225	692.2	1.035	.62513	7.34748	.84751	690.2	1.032	.62333	7.32638	.85028	693.9	1.039	.62700	7.36952	.84462
11	0	2.000	.250	691.0	1.033	.62404	7.33474	.84918	687.8	1.027	.62117	7.30094	.85362	692.7	1.036	.62592	7.35679	.84629
12	0	2.200	.275	689.8	1.031	.62296	7.32201	.85085	685.4	1.023	.61900	7.27550	.85866	691.5	1.034	.62484	7.34406	.84796
13	0	2.400	.300	688.6	1.029	.62188	7.30928	.85252	683.1	1.019	.61684	7.25006	.86030	690.3	1.032	.62375	7.33133	.84963
14	0	2.600	.325	687.4	1.027	.62079	7.29654	.85419	681.9	1.017	.61576	7.23734	.86197	687.9	1.028	.62159	7.30588	.85297
15	0	2.800	.350	681.4	1.016	.61538	7.23287	.86256	679.5	1.013	.61359	7.21190	.86532	685.5	1.024	.61942	7.28042	.85631
16	0	3.000	.375	679.0	1.012	.61321	7.20740	.86591	674.7	1.005	.60926	7.16103	.87202	681.9	1.018	.61617	7.24224	.86133
17	0	3.200	.400	675.4	1.006	.60996	7.14920	.87094	671.1	.998	.60602	7.12287	.87705	677.1	1.009	.61184	7.19132	.86803
18	0	3.400	.425	674.2	1.004	.60884	7.08262	.668.7	.994	.60385	7.09743	.88041	673.5	1.003	.60859	7.15134	.87306	
19	0	3.600	.450	671.8	1.000	.60671	7.13100	.87598	665.1	.988	.60061	7.05927	.88454	667.5	.993	.60318	7.09550	.88164
20	0	3.800	.475	668.4	.987	.60021	7.05460	.86867	659.1	.978	.59520	6.99567	.89387	659.1	.978	.59560	7.00040	.89324
21	0	4.000	.500	664.8	.977	.60000	7.04840	.86860	654.1	.969	.59047	6.94480	.89061	653.2	.968	.59018	6.93676	.90168
22	0	4.200	.525	664.2	.952	.59170	6.94192	.85817	649.2	.944	.58788	6.79216	.89293	634.0	.935	.57286	6.73311	.92885
23	0	4.400	.550	656.1	.925	.58711	6.84312	.85056	631.2	.907	.58593	6.67478	.89333	602.8	.907	.56706	6.64019	.97353
24	180	.200	.025	903.1	1.504	.60674	1.02259	.47099	952.1	1.435	.65987	1.040592	.44556	923.1	1.335	.62414	1.00446	.5157
25	180	.400	.050	1031.6	1.622	.93164	1.06005	.31967	1017.4	1.593	.91634	1.07727	.38550	961.1	1.504	.87116	1.02323	.44530
26	180	.600	.075	1079.7	1.706	.97507	1.144054	.10205	1056.8	1.666	.95439	1.121744	.25912	987.0	1.544	.89185	1.04411	.40769
27	180	.800	.100	1092.9	1.724	.98701	1.160092	.13678	1057.7	1.685	.96417	1.133242	.23991	995.4	1.561	.89547	1.05720	.39200
28	180	1.000	.125	1094.9	1.739	.99243	1.164673	.10416	1072.5	1.693	.96852	1.138353	.21426	1000.3	1.569	.90383	1.062320	.38283
29	180	1.200	.150	1093.7	1.747	.99475	1.171578	.07483	1077.3	1.701	.97287	1.14363	.19863	1003.6	1.579	.90927	1.068719	.37113
30	180	1.400	.175	1102.5	1.745	.99570	1.170302	.07848	1077.3	1.701	.97287	1.14363	.19863	1003.9	1.575	.90710	1.066159	.37584
31	180	1.600	.200	1102.5	1.745	.99570	1.170302	.07848	1077.3	1.701	.97287	1.14363	.19863	1003.9	1.575	.90710	1.066159	.37584
32	180	1.800	.225	1101.3	1.743	.99461	1.16926	.07876	1077.3	1.701	.97287	1.14363	.19863	1003.9	1.575	.90710	1.066159	.37584
33	180	2.000	.250	1099.8	1.739	.99244	1.166473	.10416	1074.9	1.697	.97069	1.14090	.20658	1001.5	1.571	.90492	1.063600	.38051
34	180	2.200	.275	1096.5	1.735	.99027	1.163921	.11826	1071.3	1.691	.96743	1.137075	.21801	999.1	1.567	.90274	1.061040	.38514
35	180	2.400	.300	1092.9	1.728	.98701	1.160092	.13678	1066.5	1.683	.96308	1.131965	.23244	994.2	1.559	.89838	1.055920	.39427
36	180	2.600	.325	1089.1	1.722	.98374	1.158264	.15314	1062.8	1.676	.95982	1.129132	.24275	989.4	1.550	.89403	1.058001	.40326
37	180	2.800	.350	1084.5	1.714	.97941	1.152159	.17264	1056.4	1.666	.95439	1.121744	.25912	984.6	1.542	.88967	1.045681	.41210
38	180	3.000	.375	1077.3	1.701	.97290	1.147501	.19851	1050.4	1.656	.94895	1.115356	.27462	977.4	1.529	.85314	1.038002	.42512
39	180	3.200	.400	1069.9	1.687	.96530	1.134568	.22519	1041.2	1.639	.94026	1.051353	.29797	971.3	1.519	.87769	1.031602	.43576
40	180	3.400	.425	1058.1	1.668	.95557	1.120382	.25577	1030.3	1.620	.93047	1.03636	.32251	959.3	1.498	.86680	1.018803	.45654
41	180	3.600	.450	1043.6	1.643	.94250	1.107747	.29211	1017.1	1.597	.91859	1.079583	.35058	947.2	1.477	.85591	1.004004	.47674
42	180	3.800	.475	1026.8	1.614	.92729	1.089900	.33016	999.1	1.566	.90221	1.060418	.38625	929.2	1.446	.83958	9.84805	.50610
43	180	4.000	.500	1000.3	1.588	.90341	1.061823	.34373	973.8	1.522	.87938	1.033589	.43247	906.3	1.406	.81889	9.62487	.54198
44	180	4.200	.525	951.0	1.483	.85889	1.049497	.47128	924.8	1.437	.83482	9.81206	.51448	862.9	1.331	.77969	9.16411	.60701
45	180	4.400	.550	877.7	1.356	.79265	9.31647	.58586	852.2	1.312	.76966	9.04550	.62328	794.2	1.212	.71762	8.43456	.70514
46	90	1.000	.125	799.0	1.220	.72155	8.48080	.69903	726.0	1.092	.65672	7.69524	.80200	695.1	1.041	.62809	7.38224	.84295
47	90	2.000	.250	801.4	1.224	.72372	8.46627	.69568	728.6	1.098	.65796	7.73340	.79702	693.9	1.039	.62700	7.36952	.84462
48	90	3.000	.375	785.8	1.197	.70963	8.34072	.71751	715.4	1.075	.64606	7.94349	.81930	681.9	1.018	.61617	7.24224	.86133
49	90	4.000	.500	736.4	1.101	.65980	7.75496	.79420	672.3	1.008	.60710	7.13559	.87537	649.6	1.062	.58694	6.89858	.90675
50	270	1.000	.125	799.4	1.219	.72699	8.47410	.69941	706.8	1.040	.61834	9.59487	.54632	1001.5	1.571	.90492	10.63600	.38051
51	270	2.000	.250	802.6	1.223	.72346	8.44999	.69553	904.0	1.01	.62634	9.64947	.54632	1000.3	1.566	.90383	10.62320	.38283
52	270	3.000	.375	781.0	1.194	.71796	8.1701	.72011	879.9	1.360	.70560	9.33935	.54635	977.4	1.529	.88114	10.38002	.42512
53	270	4.000	.500	728.6	1.059	.65801	7.73395	.76695	812.5	1.243	.73373	8.42389	.44008	903.9	1.402	.81671	9.59927	.54568
54	0	4.477	.510	717.2	1.114	.62647	7.23881	.50485	724.6	1.117	.62401	7.20324	.30404	724.6	1.108	.62236	7.32365	.34100
55	0	5.402	.675	723.3	1.124	.62012	.723465	.320372	22.0	1.125	.61984	.73323	.321306	21.3	1.126	.61926	.72374	.32348
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TABLE I.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_{\infty} = 2.96$  - Concluded(c)  $\alpha = 20^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ, p_t = 3257.5 \text{ psf}$						$\phi = 90.0^\circ, p_t = 3259.3 \text{ psf}$					
			$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$		
1	0	.000	.000	836.4	1.285	.75566	8.88169	.64551	835.2	1.282	.75616	8.86407	.64789	
2	0	.200	.025	790.9	1.206	.71452	8.39816	.70994	832.8	1.278	.75200	8.83863	.65132	
3	0	.400	.050	723.8	1.090	.65389	7.65559	.80327	802.9	1.226	.72495	8.52069	.69375	
4	0	.600	.075	721.4	1.086	.65173	7.66014	.80659	796.9	1.216	.71954	8.45711	.70216	
5	0	.800	.100	723.8	1.090	.65389	7.68559	.80327	800.5	1.222	.72278	8.49526	.69712	
6	0	1.000	.125	725.0	1.092	.65498	7.69831	.80160	798.1	1.218	.72062	8.46983	.70048	
7	0	1.200	.150	719.0	1.082	.64956	7.63469	.80992	793.3	1.210	.71629	8.41896	.70720	
8	0	1.400	.175	727.4	1.096	.65714	7.72376	.79828	800.5	1.222	.72278	8.49526	.69712	
9	0	1.600	.200	727.4	1.096	.65714	7.72376	.79828	801.7	1.224	.72386	8.50798	.69543	
10	0	1.800	.225	727.4	1.096	.65714	7.72376	.79828	801.7	1.224	.72386	8.50798	.69543	
11	0	2.000	.250	728.6	1.098	.65823	7.73649	.79662	801.7	1.224	.72386	8.50798	.69543	
12	0	2.200	.275	727.4	1.096	.65714	7.72376	.79828	801.7	1.224	.72386	8.50798	.69543	
13	0	2.400	.300	727.4	1.096	.65714	7.72376	.79828	800.5	1.222	.72278	8.49526	.69712	
14	0	2.600	.325	723.8	1.090	.65389	7.68559	.80327	796.9	1.216	.71954	8.45711	.70216	
15	0	2.800	.350	721.4	1.086	.65173	7.66014	.80659	792.1	1.208	.71521	8.40624	.70888	
16	0	3.000	.375	716.6	1.078	.64740	7.60924	.81324	787.3	1.199	.71088	8.35537	.71558	
17	0	3.200	.400	709.4	1.065	.64090	7.53289	.82322	780.1	1.187	.70439	8.27906	.72562	
18	0	3.400	.425	704.6	1.057	.63657	7.48200	.82988	772.9	1.174	.69790	8.20276	.73564	
19	0	3.600	.450	697.4	1.044	.63008	7.40565	.83988	763.3	1.158	.68924	8.10102	.74897	
20	0	3.800	.475	686.6	1.026	.62033	7.29113	.85490	749.0	1.133	.67626	7.94861	.76893	
21	0	4.000	.500	675.9	1.007	.61059	7.17661	.86997	733.4	1.106	.66219	7.78308	.79053	
22	0	4.200	.525	669.5	.961	.58677	6.89667	.90701	699.8	1.048	.63189	7.42699	.83708	
23	0	4.400	.550	611.2	.895	.55213	6.48949	.96166	649.5	.961	.58645	6.89286	.90751	
24	180	.200	.025	880.1	1.361	.79512	9.34544	.58180	831.7	1.276	.75100	8.82695	.65289	
25	180	.400	.050	889.7	1.377	.80381	9.44757	.56739	802.9	1.226	.72492	8.52037	.69379	
26	180	.600	.075	890.9	1.379	.80489	9.46034	.56558	793.2	1.210	.71622	8.41818	.70730	
27	180	.800	.100	893.3	1.384	.80706	9.48587	.56195	790.8	1.205	.71405	8.39263	.71067	
28	180	1.000	.125	898.1	1.392	.81141	9.53694	.55645	795.6	1.214	.71840	8.44372	.70393	
29	180	1.200	.150	903.0	1.400	.81575	9.58801	.54731	798.0	1.218	.72057	8.46927	.70055	
30	180	1.400	.175	903.0	1.400	.81575	9.58801	.54731	799.2	1.220	.72166	8.49205	.69887	
31	180	1.600	.200	903.0	1.400	.81575	9.58801	.54731	799.2	1.220	.72166	8.48205	.69887	
32	180	1.800	.225	903.0	1.400	.81575	9.58801	.54731	801.7	1.224	.72383	8.50759	.69548	
33	180	2.000	.250	899.3	1.394	.81250	9.54971	.55282	799.2	1.220	.72166	8.48205	.69887	
34	180	2.200	.275	899.3	1.394	.81250	9.54971	.55282	799.2	1.220	.72166	8.48205	.69887	
35	180	2.400	.300	892.1	1.382	.80598	9.47311	.56377	792.0	1.207	.71514	8.40540	.70899	
36	180	2.600	.325	888.5	1.375	.80272	9.43481	.56920	789.6	1.203	.71296	8.37985	.71236	
37	180	2.800	.350	886.1	1.371	.80055	9.440927	.57282	790.8	1.205	.71405	8.39263	.71067	
38	180	3.000	.375	880.1	1.361	.79512	9.34544	.58180	788.8	1.195	.70862	8.32876	.71909	
39	180	3.200	.400	874.1	1.350	.78968	9.28160	.59072	778.8	1.185	.70318	8.26489	.72748	
40	180	3.400	.425	862.1	1.329	.77882	9.15393	.60841	767.9	1.166	.69340	8.14992	.74257	
41	180	3.600	.450	850.1	1.309	.76796	9.02626	.62591	760.7	1.153	.68688	8.07327	.75261	
42	180	3.800	.475	836.8	1.286	.75601	8.88583	.64496	748.7	1.132	.67601	7.94553	.76931	
43	180	4.000	.500	814.0	1.246	.73537	8.64325	.67747	730.6	1.101	.65971	7.75392	.79436	
44	180	4.200	.525	771.9	1.173	.69736	8.19641	.73647	695.7	1.041	.62819	7.38347	.84279	
45	180	4.400	.550	716.6	1.078	.64739	7.66913	.81326	668.8	.960	.58580	6.88528	.90852	
46	90	1.000	.125	701.0	1.051	.63333	7.444382	.83488	710.6	1.057	.66163	7.54145	.82210	
47	90	2.000	.250	689.0	1.030	.62250	7.31658	.85156	692.6	1.035	.62540	7.35069	.84709	
48	90	3.000	.375	678.3	1.011	.61276	7.20206	.86662	679.5	1.013	.61350	7.21080	.86547	
49	90	4.000	.500	655.5	.972	.59219	6.96029	.89886	657.9	.975	.59402	6.98188	.89669	
50	270	1.000	.125	1072.5	1.694	.96891	11.38816	.21289	1101.4	1.743	.99445	11.64836	.08918	
51	270	2.000	.250	1072.5	1.694	.96891	11.38416	.21289	1102.6	1.745	.99554	11.70114	.07993	
52	270	3.000	.375	1048.4	1.652	.94719	11.13282	.27949	1078.5	1.703	.97380	11.44565	.19511	
53	270	4.000	.500	972.7	1.521	.87876	10.32850	.43370	1001.5	1.570	.90425	10.62811	.38194	
54	0	4.877	.610	25.3	.119	.02285	.26853	.3.11752	25.3	.119	.02283	.26838	3.11790	
55	0	5.402	.675	21.0	.127	.01897	.22293	.3.24388	21.2	.126	.01910	.22450	3.23910	
56	0	5.927	.741	20.7	.127	.01868	.21955	.3.25433	20.8	.127	.01881	.22112	3.24946	
57	0	6.452	.807	20.7	.127	.01868	.21955	.3.25433	20.8	.127	.01881	.22112	3.24946	
58	0	6.977	.872	20.7	.127	.01882	.22124	.3.24908	20.8	.127	.01881	.22112	3.24946	
59	180	6.977	.872	20.8	.127	.01882	.22124	.3.24908	20.8	.127	.01881	.22112	3.24946	
60	180	6.452	.807	20.8	.127	.01882	.22124	.3.24908	20.8	.127	.01881	.22112	3.24946	
61	180	5.927	.741	20.8	.127	.01882	.22124	.3.24908	20.8	.127	.01881	.22112	3.24946	
62	180	5.402	.675	21.0	.127	.01897	.22293	.3.24388	21.0	.127	.01896	.22281	3.24426	
63	180	4.877	.610	21.0	.127	.01897	.22293	.3.24388	21.0	.127	.01896	.22281	3.24426	

\*The following conversion factors can be used to convert these data to the International System of Units:

$$1 \text{ inch} = 25.4 \text{ mm}; 1 \text{ psf} = 47.88 \text{ N/m}^2.$$

TABLE II.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 3.95$ (a)  $\alpha = 0^\circ$ 

Orifice	$\theta$ , deg	s, in.	s/d	$\phi = 0.0^\circ$ , $p_t = 5807.1$ psf					$\phi = 22.5^\circ$ , $p_t = 5807.1$ psf					$\phi = 45.0^\circ$ , $p_t = 5807.1$ psf				
				$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$
1	0	.000	.000	835.7	1.780	.99384	20.43715	.00381	834.4	1.777	.99235	20.4593	.00482	834.3	1.777	.99225	20.40404	.10545
2	0	.200	.025	801.1	1.758	.98246	20.20527	.15921	824.8	1.755	.98085	20.17138	.16603	824.8	1.755	.98085	20.14951	.16643
3	0	.400	.050	800.0	1.692	.95251	19.58682	.24455	800.0	1.702	.95247	19.58501	.26841	799.6	1.699	.95091	19.55387	.26912
4	0	.600	.075	799.1	1.678	.9368	19.3293	.29946	788.9	1.675	.93917	19.29182	.30335	790.0	1.677	.93951	19.31935	.29991
5	0	.800	.100	781.7	1.650	.92076	19.1768	.32439	780.5	1.656	.92819	19.08659	.32003	780.4	1.656	.92810	19.08682	.32823
6	0	1.000	.125	774.6	1.643	.92114	18.94175	.34457	773.3	1.660	.91963	18.91067	.34804	773.2	1.660	.91955	18.90892	.34824
7	0	1.200	.150	767.4	1.627	.91259	18.76582	.36286	764.9	1.621	.90965	18.70544	.37307	764.8	1.621	.90957	18.70371	.37049
8	0	1.400	.175	761.4	1.613	.90546	18.61921	.37936	760.1	1.610	.90395	18.58816	.38257	760.0	1.610	.90386	18.58644	.38275
9	0	1.600	.200	756.6	1.602	.89975	18.50192	.39142	755.3	1.600	.89824	18.47089	.39456	754.0	1.597	.89674	18.43986	.37969
10	0	1.800	.225	751.8	1.592	.89405	18.38464	.40321	749.3	1.586	.89112	18.32429	.40918	748.0	1.583	.88961	18.29328	.41223
11	0	2.000	.250	745.8	1.578	.88697	18.23803	.41761	743.3	1.573	.88399	18.17770	.42344	744.4	1.575	.88533	18.20533	.42078
12	0	2.200	.275	741.0	1.564	.88122	18.12074	.42989	738.5	1.562	.87828	18.04042	.43611	738.4	1.562	.87820	18.05875	.43477
13	0	2.400	.300	735.0	1.554	.87409	17.97413	.44271	732.5	1.549	.87115	17.91383	.44831	732.5	1.548	.87107	17.91217	.44847
14	0	2.500	.325	729.0	1.541	.86694	17.82753	.45625	726.5	1.535	.86403	17.76724	.46175	726.5	1.535	.86395	17.75559	.46190
15	0	2.400	.350	721.8	1.525	.85840	17.65160	.47217	720.5	1.522	.85690	17.62064	.47494	720.5	1.522	.85682	17.61901	.47508
16	0	3.000	.375	714.5	1.509	.84985	17.47567	.48776	712.1	1.503	.84692	17.41541	.49304	712.1	1.503	.84684	17.41380	.49318
17	0	3.200	.400	706.2	1.490	.83987	17.27042	.50559	703.7	1.484	.83694	17.21018	.51076	703.7	1.484	.83686	17.20858	.51090
18	0	3.400	.425	696.6	1.468	.82846	17.03584	.52555	694.2	1.463	.82553	16.97563	.53064	694.0	1.463	.82545	16.97405	.53074
19	0	3.600	.450	685.8	1.444	.81562	16.77195	.54753	683.4	1.439	.81270	16.71176	.55248	682.1	1.436	.81120	16.68089	.55801
20	0	3.800	.475	670.2	1.409	.79769	16.39077	.57854	669.0	1.406	.79559	16.35993	.58102	667.7	1.404	.79409	16.32910	.54349
21	0	4.000	.500	653.5	1.372	.77713	16.04927	.61116	651.0	1.366	.77420	15.92015	.61588	650.9	1.366	.77413	15.91867	.61599
22	0	4.200	.525	619.9	1.296	.73720	15.15926	.67641	617.4	1.291	.73420	15.09922	.68126	616.2	1.291	.73413	15.09850	.68152
23	0	4.400	.550	571.9	1.189	.68016	13.99640	.76293	568.3	1.181	.67587	13.89715	.76690	566.7	1.178	.67433	13.86654	.77189
24	180	.200	.025	826.5	1.759	.98288	20.21130	.15725	824.9	1.755	.98102	20.17309	.16567	823.3	1.753	.97984	20.14973	.17083
25	180	.400	.050	802.4	1.705	.95427	19.62911	.20564	800.8	1.692	.95030	19.56093	.22693	799.0	1.699	.95123	19.56044	.26222
26	180	.600	.075	790.4	1.657	.9496	19.32871	.29673	788.9	1.675	.93806	19.24959	.33632	789.0	1.675	.93836	19.29572	.30286
27	180	.800	.100	782.0	1.626	.94520	19.02819	.32079	780.5	1.656	.92803	19.03434	.32829	779.4	1.654	.92691	19.06040	.33107
28	180	1.000	.125	772.5	1.603	.91857	18.72422	.36062	771.9	1.637	.91801	18.67730	.35174	771.0	1.635	.91690	18.65450	.35424
29	180	1.200	.150	766.3	1.584	.91135	18.47032	.36659	765.9	1.623	.91085	18.37005	.37679	765.0	1.621	.90975	18.37743	.37009
30	180	1.400	.175	757.9	1.605	.90133	18.25438	.38811	758.7	1.607	.90225	18.15325	.39616	758.7	1.605	.90117	18.153095	.38846
31	180	1.600	.200	751.9	1.592	.89418	18.07278	.42955	752.7	1.594	.88950	18.04610	.40107	751.7	1.592	.88901	18.03888	.40328
32	180	1.800	.225	745.9	1.579	.88703	18.02019	.41740	746.6	1.580	.88793	18.02585	.41559	745.7	1.578	.88686	18.23681	.41773
33	180	2.000	.250	739.9	1.565	.87987	18.09309	.43152	741.8	1.569	.88220	18.01405	.42765	740.9	1.567	.88114	18.11915	.42904
34	180	2.200	.275	735.0	1.554	.87415	17.97541	.44259	734.6	1.553	.87361	17.96435	.44362	733.7	1.551	.87256	17.94266	.44564
35	180	2.400	.300	727.8	1.538	.86557	17.79889	.46587	726.2	1.534	.86359	17.75820	.46257	725.3	1.532	.86254	17.73676	.46451
36	180	2.600	.325	718.4	1.517	.85412	17.54353	.49001	718.9	1.518	.85499	17.51515	.47842	718.1	1.516	.85396	17.56028	.48030
37	180	2.800	.350	712.2	1.503	.84697	17.41644	.49295	711.7	1.502	.84640	17.40481	.49396	710.8	1.500	.84538	17.38379	.49579
38	180	3.000	.375	703.8	1.484	.83695	17.21050	.51073	704.5	1.486	.83781	17.12281	.50922	703.0	1.484	.83680	17.20731	.51100
39	180	3.200	.400	696.5	1.468	.82837	17.03398	.52570	694.8	1.464	.82635	16.99251	.52919	695.2	1.465	.82678	17.00141	.52844
40	180	3.400	.425	684.5	1.441	.81406	16.73978	.55018	684.0	1.440	.81346	16.72746	.55119	684.4	1.441	.81391	16.73668	.55043
41	180	3.600	.450	673.7	1.417	.80118	16.47501	.57176	673.2	1.416	.80057	16.46424	.57277	673.6	1.417	.80104	16.47195	.57200
42	180	3.800	.475	662.9	1.393	.78831	16.21023	.59298	658.7	1.383	.78339	16.19092	.60101	657.9	1.382	.78244	16.08957	.60254
43	180	4.000	.500	641.2	1.344	.76256	16.04608	.63455	640.7	1.343	.76190	15.66727	.63558	639.9	1.341	.76098	15.66836	.63705
44	180	4.200	.525	607.5	1.269	.72250	15.85693	.69756	605.7	1.265	.72037	14.81323	.70086	605.0	1.263	.71950	14.79534	.70222
45	180	4.400	.550	566.6	1.177	.73885	15.63566	.77262	566.0	1.176	.73131	15.48139	.77736	564.1	1.172	.76787	13.79526	.77721
46	0	1.000	.125	775.8	1.645	.92257	18.97107	.34128	774.5	1.643	.92106	18.93999	.34477	774.4	1.642	.92097	18.93824	.34497
47	0	2.000	.250	734.4	1.573	.88407	18.17939	.43238	733.3	1.573	.88399	18.17770	.43434	744.4	1.575	.88533	18.26533	.42678
48	0	3.000	.375	708.6	1.495	.84272	17.32906	.50504	710.9	1.500	.84549	17.38609	.49559	713.3	1.506	.84826	17.44311	.49662
49	0	4.000	.500	645.1	1.353	.76714	15.77501	.62721	647.4	1.358	.76992	15.83219	.62276	649.7	1.352	.76872	15.88656	.61899
50	270	1.000	.125	773.4	1.640	.91993	18.91684	.34736	773.1	1.640	.91944	18.90675	.34448	772.7	1.637	.91833	18.89262	.35101
51	270	2.000	.250	741.1	1.598	.88336	18.12251	.40428	740.6	1.597	.88847	18.0160	.42676	739.7	1.595	.88793	18.03184	.42676
52	270	3.000	.375	707.4	1.452	.84141	17.25076	.56315	705.9	1.450	.83924	17.24756	.56170	703.6	1.448	.83690	17.20731	.51100
53	270	4.000	.500	643.6	1.350	.76542	15.39562	.64998	641.9	1.344	.76334	15.63672	.64330	639.7	1.339	.75955	15.61894	.63933
54	0	4.877	.614	19.4	-0.048	.02306	.474.18	3.11128	19.0	-0.049	.02248	3.12940	19.2	-0.049	.02284	.46960	3.11782	
55	0	5.927	.741	14.3	-0.060	.01694	.34879	3.32063	14.1	-0.050	.01677	.34476</td						

TABLE II.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_{\infty} = 3.95$  - Continued(a)  $\alpha = 0^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ, p_t = 5807.1 \text{ psf}$						$\phi = 90.0^\circ, p_t = 5807.1 \text{ psf}$					
			$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$		
1	0	.000	.000	834.3	1.777	.99225	20.40040	10545	834.2	1.776	.99207	20.40026	.10670	
2	0	.200	.025	824.8	1.755	.98085	20.16951	16643	824.6	1.755	.98067	20.16578	.16723	
3	0	.400	.050	802.0	1.704	.95376	19.61251	26094	801.8	1.704	.95359	19.60887	.26145	
4	0	.600	.075	790.0	1.677	.93951	19.31935	29991	789.8	1.677	.93933	19.31576	.30036	
5	0	.800	.100	781.6	1.659	.92953	19.11413	32481	781.5	1.658	.92935	19.11059	.32922	
6	0	1.000	.125	774.4	1.642	.92097	18.93824	34497	773.1	1.639	.91938	18.90541	.36863	
7	0	1.200	.150	766.0	1.624	.91099	18.73302	36737	764.7	1.621	.90940	18.70024	.37085	
8	0	1.400	.175	758.8	1.608	.90244	18.55713	38577	759.9	1.610	.90370	18.58300	.38311	
9	0	1.600	.200	754.0	1.597	.89674	18.43986	39769	753.9	1.596	.89657	18.43644	.39803	
10	0	1.800	.225	748.0	1.583	.88961	18.29328	41223	747.9	1.583	.88944	18.28989	.41256	
11	0	2.000	.250	742.0	1.570	.88248	18.14670	42641	741.9	1.570	.88232	18.14334	.42673	
12	0	2.200	.275	736.0	1.557	.87535	18.00012	44028	735.9	1.556	.87519	17.99678	.44060	
13	0	2.400	.300	731.3	1.546	.86965	17.88285	45117	729.9	1.543	.86806	17.85023	.45417	
14	0	2.600	.325	725.3	1.532	.86252	17.73627	46455	723.9	1.529	.86093	17.70367	.46749	
15	0	2.800	.350	718.1	1.516	.85397	17.56038	48029	716.7	1.513	.85238	17.52781	.48317	
16	0	3.000	.375	710.9	1.500	.84541	17.38648	49573	708.3	1.495	.84240	17.32264	.50109	
17	0	3.200	.400	701.3	1.479	.83401	17.14995	51569	700.0	1.476	.83243	17.11746	.51865	
18	0	3.400	.425	691.7	1.457	.82260	16.91542	53564	690.4	1.454	.82102	16.88297	.53834	
19	0	3.600	.450	680.9	1.433	.80977	16.65158	55741	678.4	1.427	.80677	16.58987	.56244	
20	0	3.800	.475	666.5	1.401	.79266	16.29978	58584	664.0	1.395	.78967	16.23814	.59076	
21	0	4.000	.500	648.5	1.361	.77128	15.86004	62058	647.2	1.358	.76971	15.82779	.62310	
22	0	4.200	.525	615.0	1.285	.73136	15.03919	66375	612.5	1.280	.72837	14.97778	.68861	
23	0	4.400	.550	565.8	1.175	.67291	13.83722	77408	563.3	1.170	.66993	13.77604	.77864	
24	180	.200	.025	823.9	1.753	.97984	20.14873	17083	822.3	1.750	.97789	20.10859	.17902	
25	180	.400	.050	799.9	1.699	.95123	19.56044	26822	798.2	1.696	.94925	19.51976	.27378	
26	180	.600	.075	787.8	1.672	.93693	19.26630	30650	788.6	1.674	.93780	19.28423	.30429	
27	180	.800	.100	779.4	1.654	.92691	19.06040	33107	778.9	1.653	.92634	19.04870	.33242	
28	180	1.000	.125	771.0	1.635	.91690	18.85450	35424	770.5	1.634	.91632	18.84261	.35554	
29	180	1.200	.150	765.0	1.621	.90975	18.70743	37009	764.5	1.620	.90916	18.69540	.37137	
30	180	1.400	.175	756.6	1.602	.89973	18.50153	39146	757.3	1.604	.90057	18.51875	.38970	
31	180	1.600	.200	751.7	1.592	.89401	18.38388	40328	752.4	1.593	.89485	18.40098	.40158	
32	180	1.800	.225	744.5	1.576	.88543	18.20739	42058	746.4	1.580	.88769	18.25377	.41608	
33	180	2.000	.250	737.3	1.559	.87685	18.03091	43739	741.6	1.569	.88196	18.13601	.42743	
34	180	2.200	.275	733.7	1.551	.87256	17.94266	44864	734.4	1.553	.87337	17.95936	.44409	
35	180	2.400	.300	725.3	1.532	.86254	17.73676	46451	728.4	1.539	.86621	17.81215	.45766	
36	180	2.600	.325	718.1	1.516	.85396	17.56028	48030	718.7	1.518	.85476	17.57662	.47885	
37	180	2.800	.350	712.0	1.503	.84681	17.41321	49323	712.7	1.504	.84760	17.42941	.49182	
38	180	3.000	.375	704.8	1.487	.83823	17.23672	50869	704.3	1.485	.83758	17.22332	.50963	
39	180	3.200	.400	696.4	1.468	.82821	17.03082	52597	697.1	1.469	.82898	17.04667	.52664	
40	180	3.400	.425	684.4	1.441	.81391	16.73668	55043	686.2	1.445	.81610	16.78170	.54672	
41	180	3.600	.450	673.6	1.417	.80104	16.47195	57200	675.4	1.421	.80321	16.51672	.56838	
42	180	3.800	.475	661.5	1.390	.78673	16.17781	59555	662.1	1.391	.78746	16.19286	.59436	
43	180	4.000	.500	641.1	1.344	.76241	15.67777	63477	644.1	1.351	.76599	15.75124	.62906	
44	180	4.200	.525	607.4	1.268	.72236	14.85417	69777	608.0	1.270	.72303	14.86799	.69672	
45	180	4.400	.550	565.3	1.174	.67230	13.82467	77501	565.8	1.175	.67292	13.83754	.77405	
46	90	1.000	.125	775.6	1.645	.92240	18.96755	34167	774.3	1.642	.92080	18.93473	.34536	
47	90	2.000	.250	745.6	1.578	.88676	18.23465	41794	744.3	1.575	.88517	18.20196	.42110	
48	90	3.000	.375	714.5	1.508	.84969	17.47243	48805	714.3	1.508	.84953	17.46919	.48833	
49	90	4.000	.500	652.1	1.369	.77556	15.94799	61369	650.8	1.366	.77399	15.91572	.61622	
50	270	1.000	.125	773.6	1.640	.91976	18.91333	36775	774.1	1.642	.92062	18.93093	.34578	
51	270	2.000	.250	739.7	1.565	.87971	18.08973	43184	740.4	1.566	.88053	18.10657	.43024	
52	270	3.000	.375	703.6	1.484	.83680	17.20731	51100	704.3	1.485	.83758	17.22332	.50963	
53	270	4.000	.500	638.7	1.339	.75955	15.61894	63933	639.3	1.340	.76026	15.63347	.63820	
54	0	4.877	.610	19.2	-.048	.02287	.47033	3.11678	19.1	-.049	.02272	.46713	3.12138	
55	0	5.402	.675	14.4	-.059	.01715	.35275	3.31283	14.4	-.059	.01718	.35329	3.31176	
56	0	5.927	.741	14.3	-.060	.01696	.34883	3.32053	14.3	-.060	.01699	.34937	3.31946	
57	0	6.452	.807	14.7	-.059	.01754	.36058	3.29770	14.6	-.059	.01737	.35722	3.30415	
58	0	6.977	.872	13.5	-.061	.01601	.32923	3.36048	13.5	-.061	.01604	.32974	3.35961	
59	180	6.977	.872	13.9	-.060	.01658	.34099	3.33621	14.3	-.060	.01699	.34937	3.31966	
60	180	6.452	.807	14.1	-.060	.01677	.34491	3.32832	14.4	-.059	.01718	.35329	3.31176	
61	180	5.927	.741	13.6	-.061	.01620	.33315	3.35229	14.0	-.060	.01661	.34151	3.33514	
62	180	5.402	.675	13.5	-.061	.01601	.32923	3.36048	13.6	-.061	.01623	.33386	3.35122	
63	180	4.877	.610	13.6	-.061	.01620	.33315	3.35229	13.8	-.061	.01642	.33759	3.34313	

\*The following conversion factors can be used to convert these data to the International System of Units:

1 inch = 25.4 mm; 1 psf = 47.88 N/m<sup>2</sup>.

TABLE II.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 3.95$  - Continued(b)  $\alpha = 5^\circ$ 

Orifice	$\theta, \text{deg}$	s, in.	s/d	$\phi = 0.0^\circ, p_t = 5807.1 \text{ psf}$					$\phi = 22.5^\circ, p_t = 5807.1 \text{ psf}$					$\phi = 45.0^\circ, p_t = 5807.1 \text{ psf}$				
				$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$
1	0	.000	.000	821.3	1.747	20.04529	.18362	820.0	1.745	.97524	20.04511	.1818.8	1.742	.97372	20.02293	.19542		
2	0	.200	.025	788.9	1.675	9.92825	.1929361	787.7	1.672	.93674	19.24250	.19697	1.683	.94236	19.37794	.29247		
3	0	.400	.050	741.0	1.568	.88122	14.1074	4.4289	741.3	1.573	.88399	18.17770	.42344	752.8	1.594	.89531	18.41054	.40063
4	0	.600	.075	739.8	1.565	.87979	18.09142	4.3168	740.9	1.567	.88114	18.11906	.42905	749.0	1.583	.88961	18.29328	.41223
5	0	.800	.100	736.2	1.557	.87551	18.00346	4.3997	737.3	1.559	.87686	18.03111	.43738	742.0	1.570	.88246	18.14670	.42661
6	0	1.000	.125	731.4	1.546	.86981	17.88617	4.5087	731.3	1.546	.86973	17.88451	.45102	736.0	1.557	.87535	18.00012	.44028
7	0	1.200	.150	728.2	1.530	.86125	17.71724	4.6690	725.3	1.533	.86260	17.73792	.46440	728.9	1.540	.86680	17.82422	.45655
8	0	1.400	.175	720.6	1.522	.85698	17.62227	4.7479	721.7	1.524	.85832	17.64996	.47232	725.3	1.532	.86252	17.73627	.46455
9	0	1.600	.200	715.8	1.511	.85127	17.50499	4.8519	716.9	1.514	.85262	17.53269	.48274	720.5	1.522	.85682	17.61901	.47508
10	0	1.800	.225	712.2	1.503	.84699	17.41702	4.9290	712.1	1.503	.84692	17.41541	.49304	716.9	1.514	.85254	17.51016	.48289
11	0	2.000	.250	707.4	1.492	.84129	17.29974	5.0307	707.3	1.492	.84121	17.29813	.50321	712.1	1.503	.84684	17.41380	.49318
12	0	2.200	.275	703.8	1.484	.83701	17.21177	5.1062	703.7	1.484	.83694	17.21018	.50176	707.3	1.492	.84114	17.29653	.50335
13	0	2.400	.300	699.0	1.474	.83131	17.09449	5.2060	699.0	1.473	.83123	17.09290	.50273	702.5	1.481	.83543	17.17927	.51340
14	0	2.600	.325	692.4	1.463	.82561	16.97720	5.3047	694.2	1.463	.82553	16.97553	.50306	697.7	1.471	.82973	17.06209	.52334
15	0	2.800	.350	685.2	1.456	.81951	16.85991	5.4020	688.2	1.449	.81846	16.89903	.50281	691.7	1.457	.82266	16.91542	.51564
16	0	3.000	.375	682.2	1.446	.81395	16.80198	5.5048	682.2	1.436	.81227	16.84244	.50248	685.7	1.444	.81947	16.76884	.54778
17	0	3.200	.400	675.0	1.420	.80279	16.70805	5.6008	675.0	1.407	.80227	16.50652	.50225	669.8	1.425	.80549	16.56363	.56458
18	0	3.400	.425	666.6	1.401	.79281	16.30280	5.6560	666.6	1.401	.79274	16.34265	.50226	668.9	1.406	.79551	16.35816	.58114
19	0	3.600	.450	658.3	1.382	.78283	16.09755	60191	657.0	1.380	.78133	16.06764	.50145	659.3	1.385	.78496	16.08141	.56216
20	0	3.800	.475	645.1	1.353	.76714	15.77501	62721	645.0	1.353	.76707	15.7355	.50231	646.1	1.355	.76943	15.80174	.58446
21	0	4.000	.500	631.9	1.323	.75146	15.45248	62617	630.6	1.320	.74996	15.42173	.50453	633.6	1.320	.74989	15.44203	.70159
22	0	4.200	.525	600.7	1.253	.71438	14.69012	71016	600.6	1.253	.71432	14.68875	.70126	600.6	1.253	.71425	14.68739	.71036
23	0	4.400	.550	588.7	1.160	.66448	13.66386	78702	585.5	1.157	.66299	13.63328	.70890	586.2	1.154	.66150	13.60270	.70159
24	180	.200	.025	837.0	1.783	.99544	20.46948	.08086	833.3	1.774	.99105	20.37923	.11341	827.2	1.761	.98380	20.23011	.15295
25	180	.400	.050	833.4	1.775	.99114	20.38112	.11283	828.5	1.764	.98532	20.26143	.14551	818.8	1.742	.97377	20.02398	.19523
26	180	.600	.075	825.0	1.756	.98111	20.17495	.16526	818.9	1.742	.97386	20.02584	.19488	808.0	1.718	.96081	19.75896	.23943
27	180	.800	.100	815.3	1.734	.96966	19.93933	.21027	812.9	1.729	.96670	19.8759	.22049	800.7	1.701	.95229	19.58228	.26519
28	180	1.000	.125	808.1	1.718	.96106	19.76262	.23087	804.4	1.710	.95664	19.67244	.25234	792.3	1.683	.94227	19.37615	.29271
29	180	1.200	.150	803.3	1.707	.95533	19.64481	.25633	798.4	1.696	.94952	19.52519	.27305	788.7	1.674	.93797	19.28780	.30384
30	180	1.400	.175	796.1	1.691	.94674	19.46810	.28072	791.2	1.680	.94092	19.34849	.29623	779.1	1.653	.92652	19.05233	.33201
31	180	1.600	.200	790.1	1.677	.93958	19.32083	.29972	785.2	1.667	.93376	19.20124	.31444	774.3	1.642	.92079	18.93444	.34539
32	180	1.800	.225	788.0	1.664	.93247	19.17357	.31776	779.1	1.653	.92660	19.05399	.33181	768.2	1.629	.91363	18.78721	.36156
33	180	2.000	.250	778.0	1.650	.92525	19.02631	.33499	771.9	1.637	.91801	18.87730	.35174	762.2	1.615	.90647	18.63997	.37719
34	180	2.200	.275	772.0	1.637	.91809	18.47905	.35154	767.1	1.626	.91229	18.75950	.36454	756.2	1.602	.89931	18.49273	.39235
35	180	2.400	.300	764.8	1.621	.90907	18.30238	.37063	759.9	1.610	.90369	18.58280	.38313	749.0	1.585	.89072	18.31605	.40999
36	180	2.600	.325	756.3	1.602	.89947	18.14936	.4016	752.7	1.594	.88809	18.05110	.40107	741.7	1.569	.88212	18.13937	.42711
37	180	2.800	.350	750.3	1.588	.89231	18.04890	.40675	744.4	1.587	.87840	18.22040	.41485	735.7	1.556	.87496	17.99214	.44103
38	180	3.000	.375	740.7	1.567	.88086	18.11328	.42960	737.0	1.559	.87648	18.07450	.42815	729.5	1.530	.86845	17.81545	.45736
39	180	3.200	.400	731.0	1.545	.86940	17.87766	.45165	728.6	1.540	.86945	17.81710	.45211	718.9	1.518	.85941	17.57988	.47856
40	180	3.400	.425	720.2	1.521	.85651	17.61259	.47655	716.5	1.513	.85213	17.52631	.48523	706.8	1.491	.84059	17.28532	.50432
41	180	3.600	.450	707.0	1.491	.84075	17.28861	.50403	704.5	1.486	.83781	17.22811	.50922	694.8	1.464	.82627	16.97994	.52322
42	180	3.800	.475	692.5	1.459	.82356	16.95158	.53399	687.6	1.448	.81776	16.81581	.54391	680.3	1.432	.80909	16.63757	.55655
43	180	4.000	.500	672.0	1.413	.79921	16.43449	.57503	668.4	1.405	.79484	16.34462	.58225	659.9	1.386	.78475	16.13697	.59879
44	180	4.200	.525	654.7	1.330	.75481	15.52146	.64668	632.2	1.324	.75181	15.46112	.65150	624.9	1.308	.74322	15.28031	.66517
45	180	4.400	.550	558.9	1.227	.70039	14.04227	.73180	585.3	1.219	.69603	14.31258	.73825	579.2	1.205	.68880	14.16402	.74965
46	90	1.000	.125	763.8	1.619	.90831	14.67795	.37322	748.1	1.594	.88969	14.29968	.41206	737.2	1.559	.87678	18.02943	.43753
47	90	2.000	.250	737.4	1.560	.87694	18.03278	.43722	722.9	1.527	.85975	17.67928	.46969	713.3	1.506	.84826	17.44311	.49062
48	90	3.000	.375	706.2	1.490	.83987	17.27042	.50559	694.2	1.463	.82553	16.97563	.53060	685.7	1.444	.81547	16.76884	.54778
49	90	4.000	.500	642.7	1.347	.76429	15.71637	.63177	635.4	1.331	.75567	15.53900	.64550	630.6	1.320	.74989	15.42030	.65644
50	270	1.000	.125	759.9	1.610	.90377	18.58452	.38295	776.7	1.648	.92374	18.99509	.33856	792.3	1.683	.94227	19.37615	.29271
51	270	2.000	.250	734.7	1.553	.87369	17.96602	.44347	747.8	1.583	.88937	18.24830	.41271	762.2	1.615	.90647	18.63997	.37719
52	270	3.000	.375	705.8	1.489	.83937	17.29916	.50656	714.1	1.507	.84927	17.46371	.48881	729.7	1.542	.86780	17.84490	.45466
53	270	4.000	.500	640.7	1.343	.76147	15.66877	.63547	647.9	1.359	.77050	15.84397	.62184	658.7	1.383	.78331	16.10753	.60112
54	0	4.477	.517	21.7	-.053	.02576	.53015	.303635	20.1	-.047	.02390	.449151	.307012	19.4	-.048	.02310	.47491	3.11024
55	0	5.402	.676	17.2	-.053	.02019	.31907	15.3	-.057	.01817	.37354	.327345	14.4	-.059	.01718	.35324	3.31186	
56	0	5.927	.741	14.9	-.054	.02005	.31234											

TABLE II.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 3.95$  - Continued(b)  $\alpha = 5^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ, p_t = 5807.1 \text{ psf}$						$\phi = 90.0^\circ, p_t = 5807.1 \text{ psf}$					
			$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$		
1	0	.000	.000	820.0	1.744	.97515	20.05225	18995	819.8	1.744	.97497	20.04853	.19066	
2	0	.200	.025	800.8	1.701	.95234	19.58319	26506	809.0	1.720	.96214	19.78474	.23547	
3	0	.400	.050	768.4	1.629	.91384	18.79165	36108	786.3	1.669	.93506	19.22783	.31121	
4	0	.600	.075	760.0	1.610	.90386	18.58644	38275	775.5	1.645	.92223	18.96404	.34207	
5	0	.800	.100	752.8	1.594	.89531	18.41054	40063	768.3	1.629	.91367	18.78817	.36146	
6	0	1.000	.125	746.8	1.581	.88818	18.26396	41509	759.9	1.610	.90370	18.58300	.38311	
7	0	1.200	.150	739.6	1.565	.87963	18.08807	43200	752.7	1.594	.89514	18.40713	.40097	
8	0	1.400	.175	734.9	1.554	.87393	17.97080	44302	749.1	1.586	.89087	18.31920	.40968	
9	0	1.600	.200	731.3	1.546	.86965	17.88285	45117	744.3	1.575	.88517	18.20196	.42110	
10	0	1.800	.225	726.5	1.535	.86395	17.76559	46190	739.5	1.564	.87946	18.08471	.43232	
11	0	2.000	.250	721.7	1.524	.85824	17.64832	47246	733.5	1.551	.87234	17.93816	.44606	
12	0	2.200	.275	716.9	1.514	.85254	17.53106	48289	728.7	1.540	.86664	17.82092	.45866	
13	0	2.400	.300	712.1	1.503	.84684	17.43180	49318	723.9	1.529	.86093	17.70367	.46749	
14	0	2.600	.325	706.1	1.489	.83971	17.26721	50587	717.9	1.516	.85381	17.55712	.48058	
15	0	2.800	.350	700.1	1.476	.83258	17.12063	51838	710.7	1.500	.84526	17.38126	.49601	
16	0	3.000	.375	694.1	1.463	.82545	16.97405	53074	703.6	1.486	.83670	17.20539	.51117	
17	0	3.200	.400	684.5	1.441	.81405	16.73952	55020	695.2	1.465	.82673	17.00022	.52854	
18	0	3.400	.425	676.1	1.422	.80407	16.53431	56696	685.6	1.444	.81532	16.76573	.54804	
19	0	3.600	.450	666.5	1.401	.79266	16.29978	58584	674.8	1.419	.80249	16.50194	.56958	
20	0	3.800	.475	652.1	1.369	.77556	15.94799	61369	660.4	1.387	.78539	16.15021	.59774	
21	0	4.000	.500	636.6	1.334	.75702	15.56688	64335	643.6	1.350	.76543	15.73986	.62995	
22	0	4.200	.525	604.2	1.261	.71853	14.77534	70373	610.1	1.274	.72552	14.91916	.69285	
23	0	4.400	.550	558.6	1.159	.66435	13.66133	78721	562.1	1.167	.66851	13.74673	.78083	
24	180	.200	.025	820.0	1.745	.97520	20.05343	18973	807.8	1.717	.96071	19.75529	.23999	
25	180	.400	.050	802.0	1.704	.95372	19.61172	26105	782.5	1.661	.93064	19.13702	.32211	
26	180	.600	.075	791.1	1.680	.94084	19.34670	29646	774.1	1.642	.92062	18.93093	.34578	
27	180	.800	.100	783.9	1.664	.93224	19.17002	31818	765.7	1.623	.91059	18.72484	.36824	
28	180	1.000	.125	776.7	1.647	.92365	18.99333	33876	759.7	1.609	.90344	18.57763	.38366	
29	180	1.200	.150	771.8	1.637	.91792	18.87555	35193	754.8	1.599	.89771	18.45987	.39567	
30	180	1.400	.175	764.6	1.621	.90933	18.69886	37100	747.6	1.582	.88912	18.28322	.41321	
31	180	1.600	.200	758.6	1.607	.90217	18.55163	38634	742.8	1.572	.88339	18.16545	.42462	
32	180	1.800	.225	753.8	1.596	.89644	18.43384	39829	740.4	1.566	.88053	18.10657	.43024	
33	180	2.000	.250	746.6	1.580	.88785	18.25716	41575	732.0	1.547	.87051	17.90048	.44955	
34	180	2.200	.275	741.7	1.569	.88212	18.13937	42711	728.4	1.539	.86621	17.81215	.45766	
35	180	2.400	.300	735.7	1.556	.87496	17.99214	44103	722.3	1.526	.85905	17.66494	.47097	
36	180	2.600	.325	728.5	1.540	.86637	17.81545	45736	713.9	1.507	.84903	17.45885	.48924	
37	180	2.800	.350	722.5	1.526	.85921	17.66822	47068	707.9	1.494	.84187	17.31164	.50204	
38	180	3.000	.375	714.0	1.507	.84919	17.46209	48896	699.5	1.475	.83185	17.10555	.51966	
39	180	3.200	.400	705.6	1.488	.83916	17.25596	50684	693.4	1.461	.82469	16.95835	.53205	
40	180	3.400	.425	694.8	1.464	.82627	16.99094	52932	682.6	1.437	.81180	16.69337	.55399	
41	180	3.600	.450	682.7	1.437	.81195	16.69647	55373	673.0	1.415	.80035	16.45784	.57314	
42	180	3.800	.475	668.3	1.405	.79477	16.34310	58237	658.5	1.383	.78317	16.10454	.60136	
43	180	4.000	.500	650.2	1.364	.77329	15.90140	61734	640.5	1.343	.76169	15.66292	.63592	
44	180	4.200	.525	615.3	1.286	.73176	15.04743	68312	608.0	1.270	.72303	14.86799	.69672	
45	180	4.400	.550	572.0	1.189	.68021	13.98734	76286	564.6	1.173	.67149	13.80810	.77625	
46	90	1.000	.125	732.5	1.548	.87107	17.91217	48487	729.9	1.543	.86806	17.85023	.45417	
47	90	2.000	.250	708.5	1.495	.84256	17.32585	50081	707.1	1.492	.84098	17.29332	.50362	
48	90	3.000	.375	682.1	1.436	.81120	16.68089	55501	680.8	1.433	.80962	16.64849	.55766	
49	90	4.000	.500	629.4	1.318	.78487	15.39098	65689	628.0	1.315	.74690	15.35882	.65936	
50	270	1.000	.125	803.2	1.707	.95516	19.64117	25686	807.8	1.717	.96071	19.75529	.23999	
51	270	2.000	.250	773.1	1.639	.91936	18.90499	34867	777.7	1.650	.92491	19.01926	.33580	
52	270	3.000	.375	736.9	1.559	.87639	18.02158	43827	741.6	1.569	.88196	18.13601	.42743	
53	270	4.000	.500	668.3	1.405	.79477	16.34310	58237	671.8	1.413	.79892	16.42840	.57552	
54	0	4.877	.610	18.8	-.049	.02236	.45973	3.13216	18.6	-.050	.02216	.45574	3.13805	
55	0	5.402	.675	13.8	-.061	.01643	.33792	3.34246	13.7	-.061	.01624	.33395	3.35063	
56	0	5.927	.741	13.3	-.062	.01586	.32613	3.36703	13.0	-.062	.01548	.31823	3.38405	
57	0	6.452	.807	14.0	-.060	.01662	.34185	3.33447	13.7	-.061	.01624	.33395	3.35063	
58	0	6.977	.872	13.2	-.062	.01567	.32220	3.37544	12.7	-.063	.01509	.31037	3.40143	
59	180	6.977	.872	12.7	-.063	.01510	.31041	3.40134	12.4	-.064	.01471	.30252	3.41929	
60	180	6.452	.807	12.9	-.063	.01529	.31434	3.39259	12.7	-.063	.01509	.31037	3.40143	
61	180	5.927	.741	13.0	-.062	.01544	.31827	3.38396	12.9	-.063	.01528	.31430	3.39268	
62	180	5.402	.675	13.2	-.062	.01567	.32220	3.37544	13.0	-.062	.01548	.31823	3.38405	
63	180	4.877	.610	13.5	-.061	.01605	.33006	3.35874	13.3	-.062	.01586	.32609	3.36712	

\*The following conversion factors can be used to convert these data to the International System of Units:

1 inch = 25.4 mm; 1 psf = 47.88 N/m<sup>2</sup>.

TABLE II.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 3.95$  - Continued(c)  $\alpha = 10^\circ$ 

Orifice	$\theta$ , deg	s, in.	s/d	$\phi = 0.0^\circ$ , $p_t = 5807.1$ psf					$\phi = 22.5^\circ$ , $p_t = 5807.1$ psf					$\phi = 45.0^\circ$ , $p_t = 5807.1$ psf				
				$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$
1	0	.000	.000	780.5	1.656	.92827	19.68335	.32782	778.4	1.651	.92573	19.02612	.23367	776.8	1.648	.92382	18.99687	.33935
2	0	.200	.025	723.0	1.527	.85983	17.44902	.44654	861.64	1.531	.86164	17.71827	.44618	732.5	1.548	.87107	17.91217	.44847
3	0	.400	.050	647.0	1.588	.77000	15.83366	.62326	655.1	1.375	.77904	16.01962	.64606	673.7	1.417	.80122	16.47568	.57170
4	0	.600	.075	660.6	1.388	.78568	16.15620	.59727	665.8	1.399	.79186	16.29320	.59716	677.3	1.425	.80549	16.56363	.56458
5	0	.800	.100	671.4	1.412	.79851	16.42020	.57619	669.4	1.407	.79613	16.37106	.59013	676.1	1.422	.80407	16.53431	.56696
6	0	1.000	.125	667.8	1.404	.79424	16.33213	.58325	667.0	1.402	.79328	16.31249	.58482	672.5	1.414	.79797	16.44636	.57407
7	0	1.200	.150	660.6	1.388	.78568	16.15620	.59727	661.1	1.389	.78616	16.16605	.59649	667.7	1.404	.79409	16.32910	.58349
8	0	1.400	.175	659.4	1.385	.78425	16.12687	.59959	659.9	1.386	.78474	16.13677	.59881	666.5	1.401	.79266	16.29978	.58584
9	0	1.600	.200	657.1	1.380	.78140	16.06823	.60423	657.5	1.381	.78189	16.07820	.60344	664.1	1.395	.78981	16.24115	.59052
10	0	1.800	.225	653.5	1.372	.77713	15.99027	.61116	653.9	1.373	.77761	15.99304	.61037	660.5	1.387	.78553	16.15320	.59751
11	0	2.000	.250	651.1	1.366	.77427	15.92162	.61576	651.5	1.367	.77477	15.93176	.61497	658.1	1.382	.78268	16.09457	.60215
12	0	2.200	.275	649.9	1.364	.77285	15.89230	.61808	649.1	1.362	.77192	15.87319	.61955	655.7	1.377	.77983	16.03594	.60678
13	0	2.400	.300	647.5	1.358	.77000	15.83366	.62264	646.7	1.356	.76907	15.81462	.62413	652.1	1.369	.77556	15.94799	.61369
14	0	2.600	.325	645.1	1.353	.76714	15.77501	.62721	643.1	1.348	.76480	15.72676	.63097	648.5	1.361	.77128	15.86004	.62058
15	0	2.800	.350	641.5	1.345	.76287	15.68705	.63045	640.7	1.343	.76195	15.66819	.63551	644.9	1.353	.76700	15.77209	.62744
16	0	3.000	.375	636.7	1.334	.75716	15.59676	.64313	635.9	1.332	.75625	15.55104	.64458	640.1	1.342	.76130	15.65483	.63655
17	0	3.200	.400	631.9	1.323	.75146	15.45248	.65217	631.1	1.322	.75055	15.43390	.65360	634.7	1.328	.75417	15.50825	.64788
18	0	3.400	.425	627.1	1.313	.74575	15.33519	.66116	626.3	1.311	.74486	15.31675	.66258	629.4	1.318	.74847	15.39098	.65585
19	0	3.600	.450	622.3	1.302	.74005	15.21790	.67014	620.3	1.297	.73747	15.17032	.67377	622.2	1.302	.73991	15.21918	.67036
20	0	3.800	.475	613.9	1.283	.73007	15.01265	.68587	608.8	1.276	.72634	14.93663	.69159	611.4	1.277	.73777	14.95124	.69202
21	0	4.000	.500	605.5	1.264	.72820	14.86500	.69612	601.2	1.255	.72638	14.77774	.70280	605.6	1.253	.74245	14.87379	.71363
22	0	4.200	.525	598.1	1.211	.71557	14.22997	.74539	579.6	1.206	.68931	14.17458	.74886	574.6	1.200	.68574	14.10107	.75436
23	0	4.400	.550	591.5	1.190	.70870	14.1132	.75000	574.9	1.186	.68450	14.05899	.75371	571.1	1.181	.68389	14.13266	.82462
24	180	.200	.025	825.0	1.756	.99111	20.17495	.61626	819.2	1.743	.97421	20.03293	.91357	805.9	1.713	.95838	19.70752	.24717
25	180	.400	.050	840.6	1.791	.99973	20.55784	.601951	832.4	1.772	.98994	20.35651	.12025	809.5	1.721	.98267	19.79576	.23375
26	180	.600	.075	843.0	1.796	1.00260	20.41674	.00000	831.2	1.770	.98851	20.32710	.12858	807.4	1.710	.95695	19.67810	.25151
27	180	.800	.100	834.2	1.785	.99687	20.49933	.66695	826.4	1.759	.98279	20.20943	.15767	799.9	1.699	.95123	19.56044	.26822
28	180	1.000	.125	832.2	1.772	.98971	20.35167	.12166	820.4	1.745	.97564	20.04234	.18804	795.0	1.689	.94551	19.44279	.28406
29	180	1.200	.150	827.4	1.761	.98398	20.23386	.15207	815.6	1.735	.96992	19.94668	.26935	790.2	1.678	.93979	19.32513	.29918
30	180	1.400	.175	821.1	1.748	.97682	20.04660	.18136	812.0	1.727	.96562	19.85643	.22411	784.2	1.664	.93263	19.17806	.31722
31	180	1.600	.200	814.6	1.737	.97109	19.96979	.20515	805.9	1.713	.95847	19.70934	.24691	781.8	1.659	.92977	19.11923	.32421
32	180	1.800	.225	818.1	1.731	.96822	19.90988	.21528	801.1	1.702	.95275	19.59167	.26387	777.0	1.644	.92405	19.00157	.33782
33	180	2.000	.250	805.7	1.713	.95820	19.70372	.24774	796.3	1.691	.94703	19.47401	.27993	772.2	1.637	.91833	18.88392	.35101
34	180	2.200	.275	800.9	1.702	.95247	19.58591	.26468	791.5	1.681	.94130	19.36534	.29523	767.4	1.627	.91261	18.76626	.36382
35	180	2.400	.300	793.7	1.686	.94387	19.40919	.28845	784.3	1.665	.93272	19.17984	.31701	761.4	1.613	.90546	18.61919	.37936
36	180	2.600	.325	790.1	1.677	.93958	19.32083	.29972	778.3	1.651	.92557	19.03275	.33425	754.1	1.597	.89687	18.44270	.39740
37	180	2.800	.350	780.4	1.656	.92812	19.04521	.32819	771.1	1.635	.91699	18.85625	.35405	749.3	1.586	.89115	18.32505	.40911
38	180	3.000	.375	772.0	1.637	.91809	18.47905	.35154	763.8	1.619	.90840	18.67975	.37302	740.9	1.567	.88114	18.11915	.42904
39	180	3.200	.400	766.0	1.624	.91093	18.47178	.36750	754.2	1.597	.89696	18.44441	.39723	732.5	1.549	.87113	17.91325	.44637
40	180	3.400	.425	752.7	1.594	.89518	18.47811	.40900	742.4	1.570	.88265	18.15024	.42607	721.7	1.524	.85825	17.64852	.47244
41	180	3.600	.450	740.7	1.567	.88085	18.43282	.42966	730.4	1.543	.86835	17.85606	.45364	709.6	1.487	.84395	17.35438	.49484
42	180	3.800	.475	723.8	1.530	.86500	18.37121	.45700	713.7	1.511	.85118	17.50307	.48523	690.6	1.452	.82535	16.47199	.53200
43	180	4.000	.500	707.1	1.481	.83502	17.17080	.51412	691.1	1.463	.83503	16.84202	.53798	673.6	1.417	.81747	16.47195	.52000
44	180	4.200	.525	663.6	1.394	.78919	16.22832	.56515	655.6	1.376	.77955	16.03223	.66767	638.7	1.339	.75955	16.61894	.53933
45	180	4.400	.550	614.2	1.284	.73046	15.02077	.68515	607.5	1.269	.72243	14.95555	.67676	590.6	1.231	.70234	14.44237	.72879
46	90	1.000	.125	721.8	1.525	.85840	17.65160	.67217	691.0	1.456	.82777	16.89212	.53707	672.5	1.414	.79797	16.44636	.57407
47	90	2.000	.250	706.2	1.490	.83987	17.27042	.50559	676.6	1.423	.80467	16.54678	.56595	655.3	1.385	.78411	16.12388	.59983
48	90	3.000	.375	681.0	1.433	.80992	16.65466	.55716	656.3	1.378	.78046	16.04891	.60575	643.1	1.344	.76272	15.68414	.63642
49	90	4.000	.500	625.9	1.310	.74433	15.30587	.66342	607.2	1.268	.72207	14.84817	.60822	599.4	1.251	.71283	14.65808	.71257
50	270	1.000	.125	723.8	1.529	.86808	17.70095	.46774	716.4	1.613	.90554	16.26209	.37918	707.4	1.694	.94837	19.50162	.27624
51	270	2.000	.250	705.8	1.489	.83932	17.25916	.50656	693.8	1.565	.87979	16.09141	.43168	772.2	1.637	.91833	18.88392	.35101
52	270	3.000	.375	680.5	1.432	.80924	16.64066	.55830	709.7	1.498	.84403	17.35999	.40421	739.7	1.565	.87971	18.09773	.43184
53	270	4.000	.500	625.1	1.308	.74335	15.28584	.66495	667.2	1.358	.76964	15.82631	.42321	672.4	1.414	.79961	16.44254	.57438
54	0	4.877	.610	14.8	-.050	.02231	.45882	3.13349	14.1	-.051	.02156	.44332	3.16674	17.4	-.052	.02118	.43548	3.16884
55	0	5.402	.675	13.6	-.061	.01621	.33333	3.35191	13.0	-.062	.01545	.31778	3.38503	12.7	-.063	.01507	.30993	

TABLE II.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 3.95$  - Continued(c)  $\alpha = 10^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ, p_t = 5807.1 \text{ psf}$						$\phi = 90.0^\circ, p_t = 5807.1 \text{ psf}$					
			$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$		
1	0	.000	.000	776.4	1.647	.92334	18.98689	.33949	777.9	1.650	.92516	19.02442	.33521	
2	0	.200	.025	747.6	1.582	.88909	18.28259	.41327	768.3	1.629	.91376	18.78991	.36127	
3	0	.400	.050	705.6	1.488	.83914	17.25547	.50688	743.2	1.572	.88382	18.17433	.42376	
4	0	.600	.075	700.8	1.478	.83343	17.13809	.51690	733.6	1.551	.87242	17.93982	.44590	
5	0	.800	.100	696.0	1.467	.82772	17.02071	.52682	728.8	1.540	.86672	17.82257	.45671	
6	0	1.000	.125	691.2	1.456	.82201	16.90332	.53664	722.8	1.527	.85959	17.67600	.46998	
7	0	1.200	.150	686.4	1.445	.81631	16.78594	.54637	716.8	1.513	.85246	17.52944	.48303	
8	0	1.400	.175	685.2	1.443	.81488	16.75659	.54879	715.6	1.511	.85104	17.50012	.48562	
9	0	1.600	.200	682.8	1.437	.81202	16.69790	.55362	713.2	1.505	.84810	17.44150	.49076	
10	0	1.800	.225	679.2	1.429	.80774	16.60986	.56081	709.6	1.497	.84391	17.35355	.49842	
11	0	2.000	.250	676.8	1.424	.80489	16.55117	.56559	706.0	1.489	.83963	17.26561	.50601	
12	0	2.200	.275	673.2	1.416	.80061	16.46313	.57272	702.4	1.481	.83536	17.17767	.51353	
13	0	2.400	.300	669.6	1.408	.79633	16.37509	.57980	697.6	1.470	.82965	17.06042	.52348	
14	0	2.600	.325	664.8	1.397	.79062	16.25771	.58920	692.8	1.460	.82395	16.94317	.53332	
15	0	2.800	.350	661.2	1.389	.78634	16.16967	.59620	688.0	1.449	.81825	16.82591	.54307	
16	0	3.000	.375	655.2	1.376	.77920	16.02294	.60780	682.0	1.436	.81112	16.67935	.55514	
17	0	3.200	.400	648.0	1.359	.77064	15.84686	.62161	673.7	1.417	.80114	16.47415	.57183	
18	0	3.400	.425	642.0	1.346	.76302	15.70013	.63304	665.3	1.398	.79116	16.26896	.58830	
19	0	3.600	.450	633.6	1.327	.75351	15.49471	.64492	655.7	1.377	.77976	16.03445	.60689	
20	0	3.800	.475	621.6	1.300	.73924	15.20125	.67141	642.5	1.347	.76048	15.71200	.63211	
21	0	4.000	.500	608.4	1.271	.72354	14.87844	.65953	626.9	1.312	.74555	15.33093	.66150	
22	0	4.200	.525	580.8	1.209	.69072	14.20349	.74670	595.7	1.242	.70848	14.56878	.71929	
23	0	4.400	.550	538.8	1.115	.64077	13.17637	.82343	549.0	1.138	.65289	13.42555	.80481	
24	180	.200	.025	786.2	1.669	.93502	19.22713	.31130	766.1	1.624	.91109	18.73511	.36715	
25	180	.400	.050	776.6	1.647	.92357	18.99157	.33895	734.8	1.554	.87391	17.97041	.44306	
26	180	.600	.075	765.8	1.623	.91068	18.72658	.36806	727.6	1.538	.86532	17.79394	.45932	
27	180	.800	.100	759.7	1.610	.90352	18.57935	.38348	721.6	1.524	.85817	17.64689	.47259	
28	180	1.000	.125	754.9	1.599	.89779	18.46158	.39550	716.8	1.513	.85245	17.52924	.48305	
29	180	1.200	.150	752.5	1.593	.89493	18.40269	.40161	715.6	1.511	.85102	17.49983	.48564	
30	180	1.400	.175	748.9	1.585	.89063	18.31346	.41016	710.8	1.500	.84530	17.38218	.49593	
31	180	1.600	.200	744.1	1.575	.88490	18.19658	.42162	707.2	1.492	.84101	17.29395	.50357	
32	180	1.800	.225	741.7	1.569	.88204	18.13769	.42727	704.8	1.486	.83815	17.23512	.50862	
33	180	2.000	.250	736.9	1.558	.87631	18.01991	.43843	700.0	1.476	.83243	17.11748	.51865	
34	180	2.200	.275	733.2	1.550	.87202	17.93158	.44667	698.8	1.473	.83100	17.08807	.52114	
35	180	2.400	.300	726.0	1.534	.86343	17.75491	.46286	692.7	1.460	.82385	16.94101	.53350	
36	180	2.600	.325	720.0	1.521	.85627	17.60769	.47609	686.7	1.446	.81669	16.79395	.54571	
37	180	2.800	.350	716.4	1.513	.85197	17.51936	.48392	683.1	1.438	.81240	16.70572	.55298	
38	180	3.000	.375	708.0	1.494	.84195	17.31325	.50190	677.1	1.425	.80525	16.55866	.56498	
39	180	3.200	.400	700.7	1.477	.83336	17.13658	.51703	669.9	1.408	.79667	16.38219	.57923	
40	180	3.400	.425	689.9	1.453	.82047	16.87158	.53928	661.5	1.390	.78666	16.17631	.59567	
41	180	3.600	.450	680.3	1.432	.80902	16.63603	.55868	656.0	1.365	.77379	15.91161	.61654	
42	180	3.800	.475	665.8	1.399	.79183	16.28270	.58720	638.6	1.338	.75948	15.61749	.63944	
43	180	4.000	.500	646.6	1.356	.76892	15.81159	.62436	623.0	1.303	.74089	15.23514	.66882	
44	180	4.200	.525	614.0	1.283	.73026	15.01659	.65856	591.7	1.233	.70370	14.47045	.72668	
45	180	4.400	.550	567.1	1.178	.67442	13.86827	.77176	549.6	1.139	.65364	13.44104	.80365	
46	90	1.000	.125	664.8	1.397	.79062	16.25771	.58920	664.1	1.395	.78974	16.23964	.59064	
47	90	2.000	.250	651.6	1.367	.77492	15.93490	.61472	649.7	1.363	.77263	15.88788	.61840	
48	90	3.000	.375	636.0	1.333	.75637	15.55340	.64439	635.3	1.331	.75553	15.53612	.64573	
49	90	4.000	.500	598.8	1.249	.71213	14.64368	.71365	600.5	1.253	.71419	14.66603	.71046	
50	270	1.000	.125	824.8	1.755	.98084	20.16935	.16647	831.0	1.769	.98833	20.32333	.12961	
51	270	2.000	.250	795.9	1.690	.94648	19.46268	.28144	804.6	1.710	.95686	19.67628	.25178	
52	270	3.000	.375	760.9	1.612	.90495	18.60880	.38044	769.7	1.632	.91538	18.82334	.35764	
53	270	4.000	.500	693.5	1.461	.82477	16.95992	.53192	701.2	1.478	.83386	17.14689	.51615	
54	0	4.877	.610	17.0	-.053	.02023	.41604	3.19986	16.8	-.054	.02003	.41188	3.20668	
55	0	5.402	.675	12.2	-.064	.01451	.29829	3.42911	11.9	-.065	.01412	.29028	3.44813	
56	0	5.927	.741	11.7	-.065	.01393	.28652	3.45727	11.5	-.066	.01373	.28244	3.46733	
57	0	6.452	.807	12.4	-.064	.01470	.30222	3.41999	12.4	-.064	.01469	.30205	3.42037	
58	0	6.977	.872	11.6	-.066	.01374	.28259	3.46694	11.4	-.066	.01354	.27851	3.47714	
59	180	6.977	.872	11.6	-.066	.01374	.28259	3.46694	11.4	-.066	.01354	.27851	3.47714	
60	180	6.452	.807	11.6	-.066	.01374	.28259	3.46694	11.4	-.066	.01354	.27851	3.47714	
61	180	5.927	.741	11.6	-.066	.01374	.28259	3.46694	11.4	-.066	.01354	.27851	3.47714	
62	180	5.402	.675	11.4	-.066	.01355	.27867	3.47675	11.4	-.066	.01354	.27851	3.47714	
63	180	4.877	.610	11.6	-.066	.01374	.28259	3.46694	11.5	-.066	.01373	.28244	3.46733	

\*The following conversion factors can be used to convert these data to the International System of Units:

1 inch  $\square$  25.4 mm; 1 psf  $\square$  47.88 N/m<sup>2</sup>.

TABLE II.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 3.95$  - Continued(d)  $\alpha = 15^\circ$ 

Orifice	$\theta$ , deg	s, in.	s/d	$\phi = 0.0^\circ$ , $p_t = 5807.1$ psf					$\phi = 22.5^\circ$ , $p_t = 5807.1$ psf					$\phi = 45.0^\circ$ , $p_t = 5807.1$ psf				
				$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$
1	0	.000	.000	711.0	1.500	.84557	17.38770	.49445	707.8	1.493	.84170	17.30822	.5n234	704.9	1.487	.83828	17.23790	.50839
2	0	.200	.025	634.3	1.329	.75431	15.51112	.64765	634.9	1.332	.75625	15.55104	.64458	644.9	1.353	.76700	15.77209	.62744
3	0	.400	.050	520.4	1.074	.61885	12.72557	.85720	532.4	1.102	.63377	13.03242	.83419	565.8	1.175	.67291	13.83722	.77408
4	0	.600	.075	544.3	1.127	.64737	13.31200	.81320	553.3	1.147	.65798	13.53029	.79699	573.0	1.191	.68146	14.01312	.76093
5	0	.800	.100	582.7	1.213	.69300	14.25029	.74319	573.6	1.193	.68219	14.02815	.75981	576.6	1.200	.68574	14.10107	.75436
6	0	1.000	.125	589.3	1.208	.69014	14.19165	.74758	576.0	1.198	.68504	14.08673	.75543	577.8	1.202	.68716	14.13039	.75217
7	0	1.200	.150	571.9	1.189	.68016	13.98640	.76293	572.4	1.190	.68077	13.99887	.76200	575.4	1.197	.68431	14.07175	.75655
8	0	1.400	.175	574.3	1.194	.68301	14.04504	.75855	572.4	1.190	.68077	13.99887	.76200	577.8	1.202	.68716	14.13039	.75217
9	0	1.600	.200	573.1	1.192	.68159	14.01572	.76074	572.4	1.190	.68077	13.99887	.76200	576.6	1.200	.68574	14.10107	.75436
10	0	1.800	.225	571.9	1.189	.68016	13.98640	.76293	571.2	1.188	.67934	13.96958	.76419	576.6	1.200	.68574	14.10107	.75436
11	0	2.000	.250	570.7	1.186	.67874	13.95708	.76512	571.2	1.188	.67934	13.96958	.76419	575.4	1.197	.68431	14.07175	.75655
12	0	2.200	.275	570.7	1.186	.67874	13.95708	.76512	570.0	1.185	.67792	13.94029	.76638	575.4	1.197	.68431	14.07175	.75655
13	0	2.400	.300	570.7	1.186	.67874	13.95708	.76512	564.8	1.182	.67650	13.91101	.76857	575.4	1.197	.68431	14.07175	.75655
14	0	2.600	.325	569.5	1.184	.67731	13.92775	.76731	567.6	1.179	.67507	13.84172	.77075	573.0	1.191	.68146	14.01312	.76093
15	0	2.800	.350	569.5	1.184	.67731	13.92775	.76731	566.4	1.177	.67365	13.85243	.77294	571.8	1.189	.68004	13.93881	.76313
16	0	3.000	.375	567.1	1.178	.67446	13.86911	.77169	565.2	1.174	.67222	13.82315	.77513	569.4	1.183	.67719	13.92517	.76751
17	0	3.200	.400	564.7	1.173	.67161	13.81047	.77067	564.0	1.171	.67080	13.79386	.77773	567.0	1.178	.67433	13.86654	.77189
18	0	3.400	.425	563.5	1.170	.67018	13.78115	.77826	566.5	1.163	.66653	13.76060	.78387	563.4	1.170	.67006	13.77859	.77845
19	0	3.600	.450	562.3	1.168	.66876	13.75183	.78045	568.1	1.158	.66338	13.64743	.78825	559.8	1.162	.66748	13.69064	.78502
20	0	3.800	.475	559.3	1.160	.66648	13.66386	.78102	553.3	1.157	.66398	13.55270	.79699	552.6	1.156	.66723	13.51455	.7810
21	0	4.000	.500	556.3	1.154	.66163	13.48252	.79140	549.7	1.139	.65371	13.45243	.80555	546.4	1.132	.65011	13.3317	.8010
22	0	4.200	.525	554.1	1.151	.65892	13.42177	.80446	541.4	1.104	.63519	13.04170	.89200	527.6	1.089	.62729	13.29911	.84148
23	0	4.400	.550	505.6	1.040	.60601	12.44168	.87706	504.6	1.043	.60244	12.38812	.88261	497.5	1.022	.59165	12.14620	.80940
24	180	.200	.025	788.0	1.673	.93710	19.26987	.30506	781.9	1.659	.92986	19.12100	.32400	759.8	1.610	.92360	18.58108	.38231
25	180	.400	.050	825.3	1.754	.99145	20.19188	.16377	815.6	1.735	.96992	19.94468	.20935	780.3	1.656	.92795	19.01168	.32860
26	180	.600	.075	844.5	1.799	1.00434	20.45260	.00000	832.4	1.772	.98994	20.35651	.12025	786.3	1.669	.93511	19.22891	.31108
27	180	.800	.100	844.1	1.807	1.00843	20.47082	.00000	833.6	1.775	.99137	20.38593	.11132	786.3	1.669	.93511	19.22891	.31108
28	180	1.000	.125	845.7	1.802	1.00577	20.48202	.00000	833.6	1.775	.99137	20.38593	.11132	786.3	1.669	.93511	19.22891	.31108
29	180	1.200	.150	845.7	1.802	1.00577	20.48202	.00000	832.4	1.772	.98994	20.35651	.12025	785.1	1.666	.93368	19.19946	.31465
30	180	1.400	.175	842.1	1.794	1.00148	20.59375	.00000	828.8	1.764	.98565	20.28926	.14394	782.7	1.661	.93081	19.14057	.32169
31	180	1.600	.200	839.7	1.789	.99862	20.53922	.04443	826.4	1.759	.98279	20.20943	.15767	779.1	1.653	.92652	19.05223	.33201
32	180	1.800	.225	836.1	1.781	.99433	20.44666	.09191	824.0	1.753	.97993	20.15060	.17043	777.9	1.650	.92508	19.02278	.33540
33	180	2.000	.250	831.3	1.770	.98860	20.32898	.12066	819.2	1.743	.97421	20.03293	.19357	773.1	1.639	.91936	18.90499	.34867
34	180	2.200	.275	827.7	1.762	.98431	20.24072	.15047	815.6	1.735	.96992	19.94468	.20935	770.6	1.634	.91649	18.84610	.35516
35	180	2.400	.300	826.1	1.754	.98002	20.15246	.17004	809.6	1.721	.96276	19.79759	.23347	764.6	1.621	.90933	18.69886	.37100
36	180	2.600	.325	816.8	1.737	.97144	19.75959	.20389	803.5	1.708	.95561	19.65051	.25551	759.8	1.610	.90360	18.51018	.38331
37	180	2.800	.350	812.0	1.727	.95671	19.85287	.22381	797.8	1.697	.94989	19.53284	.27201	755.0	1.599	.89788	18.46329	.39533
38	180	3.000	.375	803.6	1.704	.95570	19.65233	.25525	791.5	1.681	.94130	19.35634	.29523	747.8	1.583	.88928	18.28661	.41288
39	180	3.200	.400	796.4	1.692	.94711	19.47581	.27969	784.3	1.665	.93272	19.17984	.31701	740.5	1.567	.88069	18.10992	.42992
40	180	3.400	.425	785.6	1.667	.93242	19.21103	.31325	773.5	1.640	.91985	18.91508	.34755	729.7	1.542	.86780	17.84490	.45466
41	180	3.600	.450	773.5	1.640	.91993	19.16848	.34736	761.4	1.613	.90558	18.62092	.37918	718.9	1.518	.85491	17.57988	.47856
42	180	3.800	.475	757.9	1.605	.90133	18.54348	.38811	745.4	1.578	.88694	18.23850	.41757	704.4	1.486	.83773	17.22651	.50936
43	180	4.000	.500	736.2	1.557	.87558	18.04043	.43984	724.1	1.530	.86119	17.70899	.46702	685.1	1.443	.81482	16.75536	.54890
44	180	4.200	.525	697.4	1.471	.82940	17.06340	.52323	685.7	1.444	.81542	16.76765	.54788	649.7	1.382	.77186	15.87195	.61965
45	90	1.000	.125	643.6	1.334	.87546	17.98137	.61313	631.6	1.328	.87066	17.80300	.72531	625.0	1.288	.71171	14.63517	.71429
46	90	3.000	.134	575.7	1.334	.75714	15.9476	.61313	551.4	1.328	.70600	15.51000	.72531	570.6	1.266	.68861	13.95449	.76532
47	90	4.000	.135	592.3	1.335	.70440	14.48486	.72620	560.5	1.163	.66867	13.33685	.81129	545.4	1.130	.64867	13.33685	.81129
48	90	5.000	.138	520.0	1.382	.72929	16.02555	.60231	725.3	1.533	.65262	17.73941	.46436	784.3	1.669	.92311	17.22811	.31108
49	270	1.000	.125	650.0	1.382	.72929	16.02555	.60231	725.3	1.533	.65262	17.73941	.46436	784.3	1.669	.92311	17.22811	.31108
50	270	2.000	.250	653.2	1.371	.77686	15.79487	.61658	718.1	1.516	.65404	17.54191	.48016	776.7	1.647	.92365	18.93333	.3576
51	270	3.000	.375	637.6	1.334	.75826	15.59242	.66138	696.5	1.468	.62829	17.03240	.52584	750.7	1.588	.89215	18.34560	.44709
52	270	4.000	.500	591.9	1.234	.70390	14.47447	.72328	639.9	1.341	.76105	15.64981	.63694	687.6	1.448	.81768	16.81425	.54404
53	0	4.877	.610	17.3	-.053	.02058	.42323	.19420	17.0	-.054	.02021	.41569	.32043	16.9	-.054	.02004	.41211	.3-20531
54	0	5.927	.741	12.0	-.065	.01429	.29391	.3.43944	11.5	-.066	.01373	.28235	.3.46753	11.2	-.066	.01336	.27474	.3.48672
55	0	5.402	.675	12.3	-.064	.01467	.30175	.3.42196	12.0	-.065	.0144							

TABLE 11.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 3.95$  - Continued(d)  $\alpha = 15^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ$ , $p_t = 5807.1$ psf						$\phi = 90.0^\circ$ , $p_t = 5807.1$ psf					
			$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$		
1	0	.000	.000	703.6	1.484	.83678	17.20699	.51103	707.1	1.492	.84098	17.29332	.50362	
2	0	.200	.025	667.7	1.403	.79402	16.32758	.58361	697.6	1.470	.82958	17.05884	.52361	
3	0	.400	.050	613.7	1.283	.72987	15.00848	.68608	672.4	1.414	.79964	16.44331	.57431	
4	0	.600	.075	608.9	1.272	.72416	14.89123	.69497	664.0	1.395	.78967	16.23814	.59076	
5	0	.800	.100	606.5	1.267	.72131	14.83260	.69940	660.4	1.387	.78539	16.15021	.59774	
6	0	1.000	.125	605.3	1.264	.71989	14.80329	.70162	658.0	1.382	.78254	16.09159	.60238	
7	0	1.200	.150	600.5	1.253	.71419	14.68603	.71046	654.4	1.374	.77826	16.00365	.60932	
8	0	1.400	.175	604.1	1.261	.71846	14.7397	.70383	655.6	1.376	.77969	16.03296	.60701	
9	0	1.600	.200	602.9	1.258	.71704	14.74466	.70604	655.6	1.376	.77969	16.03296	.60701	
10	0	1.800	.225	602.9	1.258	.71704	14.74466	.70604	654.4	1.374	.77826	16.00365	.60932	
11	0	2.000	.250	601.7	1.256	.71561	14.71535	.70825	653.2	1.371	.77684	15.97434	.61162	
12	0	2.200	.275	601.7	1.256	.71561	14.71535	.70825	652.0	1.368	.77541	15.94503	.61392	
13	0	2.400	.300	600.5	1.253	.71419	14.68603	.71046	649.6	1.363	.77256	15.88641	.61852	
14	0	2.600	.325	598.1	1.248	.71134	14.62741	.71488	646.0	1.355	.76828	15.79848	.62539	
15	0	2.800	.350	595.7	1.242	.70848	14.56878	.71929	643.6	1.350	.76543	15.73986	.62995	
16	0	3.000	.375	593.3	1.237	.70563	14.51015	.72370	638.8	1.339	.75973	15.62261	.63904	
17	0	3.200	.400	587.3	1.224	.69851	14.36358	.73470	632.8	1.325	.75261	15.47606	.65035	
18	0	3.400	.425	583.8	1.216	.69423	14.27564	.74129	626.8	1.312	.74548	15.32951	.66161	
19	0	3.600	.450	579.0	1.205	.68853	14.15839	.75007	618.5	1.293	.73550	15.12433	.67727	
20	0	3.800	.475	569.4	1.183	.67712	13.92388	.76760	608.5	1.266	.72125	14.83122	.69950	
21	0	4.000	.500	561.0	1.165	.66714	13.71869	.78293	594.5	1.240	.70699	14.53812	.72160	
22	0	4.200	.525	537.0	1.111	.63863	13.13242	.82671	565.7	1.175	.67278	13.83466	.77427	
23	0	4.400	.550	502.2	1.033	.59729	12.28233	.89060	523.8	1.081	.62289	12.80878	.85095	
24	180	.200	.025	729.6	1.542	.86772	17.84325	.45481	697.5	1.470	.82949	17.05707	.52376	
25	180	.400	.050	728.4	1.539	.86629	17.81380	.45751	667.4	1.403	.79374	16.32186	.58407	
26	180	.600	.075	723.6	1.529	.86056	17.69602	.46818	657.8	1.381	.78230	16.08659	.60278	
27	180	.800	.100	721.2	1.523	.85770	17.63714	.47346	653.0	1.371	.77657	15.96895	.61205	
28	180	1.000	.125	720.0	1.521	.85627	17.60769	.47609	653.0	1.371	.77657	15.96895	.61205	
29	180	1.200	.150	720.0	1.521	.85627	17.60769	.47609	653.0	1.371	.77657	15.96895	.61205	
30	180	1.400	.175	718.8	1.518	.85484	17.57825	.47871	653.0	1.371	.77657	15.96895	.61205	
31	180	1.600	.200	716.4	1.513	.85197	17.51936	.48392	650.6	1.365	.77371	15.91013	.61666	
32	180	1.800	.225	716.4	1.513	.85197	17.51936	.48392	650.6	1.365	.77371	15.91013	.61666	
33	180	2.000	.250	711.6	1.502	.84624	17.4158	.49424	648.2	1.360	.77085	15.85132	.62126	
34	180	2.200	.275	709.2	1.496	.84338	17.34269	.49936	648.2	1.360	.77085	15.85132	.62126	
35	180	2.400	.300	704.4	1.486	.83765	17.24292	.50950	643.4	1.349	.76513	15.73368	.63043	
36	180	2.600	.325	699.5	1.475	.83193	17.10714	.51953	639.8	1.341	.76084	15.64545	.63728	
37	180	2.800	.350	697.1	1.469	.82906	17.04825	.52450	638.6	1.338	.75941	15.61605	.63955	
38	180	3.000	.375	692.3	1.459	.82333	16.93047	.53438	633.8	1.327	.75369	15.49841	.64883	
39	180	3.200	.400	685.1	1.442	.81474	16.75381	.54902	632.5	1.325	.75226	15.46900	.65090	
40	180	3.400	.425	675.5	1.421	.80329	16.51825	.56826	621.7	1.301	.73939	15.20432	.67118	
41	180	3.600	.450	665.8	1.399	.79183	16.28270	.58720	614.5	1.284	.73081	15.02787	.68461	
42	180	3.800	.475	652.6	1.370	.77608	15.95881	.61284	604.9	1.263	.71937	14.79260	.70242	
43	180	4.000	.500	636.9	1.335	.75747	15.57604	.64265	590.5	1.231	.70221	14.43970	.72899	
44	180	4.200	.525	603.2	1.259	.71737	14.75159	.70552	564.0	1.171	.67074	13.79270	.77740	
45	180	4.400	.550	559.9	1.162	.66583	13.69160	.78495	524.3	1.082	.62355	12.82221	.84994	
46	90	1.000	.125	574.2	1.194	.68282	14.04114	.75884	582.5	1.213	.69274	14.24501	.74359	
47	90	2.000	.250	570.6	1.186	.67855	13.95320	.76541	571.7	1.189	.67991	13.98121	.76332	
48	90	3.000	.375	565.8	1.175	.67285	13.83594	.77417	566.9	1.178	.67421	13.86397	.77208	
49	90	4.000	.500	547.8	1.135	.65146	13.39624	.80700	551.3	1.143	.65568	13.48293	.80053	
50	270	1.000	.125	830.8	1.769	.98800	20.31657	.13144	845.4	1.801	.100540	20.67435	.00000	
51	270	2.000	.250	816.3	1.736	.97082	19.96324	.20613	831.0	1.769	.98824	20.32145	.13012	
52	270	3.000	.375	789.8	1.677	.93932	19.31546	.30309	802.1	1.704	.95391	19.61564	.26050	
53	270	4.000	.500	723.6	1.529	.86056	17.69602	.46818	736.0	1.556	.87526	17.99815	.44047	
54	0	4.877	.610	19.1	-.049	.02277	.46818	3.11986	16.4	-.055	.01948	.40057	3.22567	
55	0	5.402	.675	14.3	-.060	.01698	.34922	3.31975	11.2	-.066	.01337	.27490	3.48632	
56	0	5.927	.741	13.8	-.061	.01642	.33771	3.34290	10.8	-.067	.01280	.26312	3.51716	
57	0	6.452	.807	14.6	-.059	.01736	.35689	3.30478	11.6	-.066	.01375	.28275	3.46654	
58	0	6.977	.872	13.8	-.061	.01642	.33771	3.34290	10.6	-.068	.01260	.25919	3.52778	
59	180	6.977	.872	13.7	-.061	.01624	.33387	3.35080	10.6	-.068	.01260	.25919	3.52778	
60	180	6.452	.807	13.7	-.061	.01624	.33387	3.35080	10.8	-.067	.01280	.26312	3.51716	
61	180	5.927	.741	13.7	-.061	.01624	.33387	3.35080	10.8	-.067	.01280	.26312	3.51716	
62	180	5.402	.675	13.7	-.061	.01624	.33387	3.35080	10.6	-.068	.01260	.25919	3.52778	
63	180	4.877	.610	13.8	-.061	.01642	.33771	3.34290	10.8	-.067	.01280	.26312	3.51716	

\*The following conversion factors can be used to convert these data to the International System of Units:

1 inch = 25.4 mm; 1 psf = 47.88 N/m<sup>2</sup>.

TABLE II.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_{\infty} = 3.95$  - Continued(e)  $\alpha = 20^\circ$ 

Orifice	$\theta$ , deg	s, in.	s/d	$\phi = 0.0^\circ$ , $p_t = 5807.1$ psf					$\phi = 22.5^\circ$ , $p_t = 5807.1$ psf					$\phi = 45.0^\circ$ , $p_t = 5807.1$ psf					
				$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	
1	0	.000	.000	642.6	1.347	.78422	15.71492	.63189	639.0	1.339	.75994	15.62696	.63871	634.9	1.330	.75501	15.52550	.64655	
2	0	.200	.025	559.9	1.162	.66584	13.69191	.74993	558.7	1.159	.66442	13.66259	.74711	567.7	1.179	.67508	13.88197	.77073	
3	0	.400	.050	402.8	.810	.47906	9.95114	1.08167	424.0	.867	.50901	10.46684	1.03153	471.6	.965	.56090	11.53406	.94711	
4	0	.600	.075	417.2	.843	.49617	10.24297	1.05284	432.8	.878	.51471	10.58411	1.02215	468.0	.956	.55662	11.44602	.95450	
5	0	.800	.100	499.3	1.006	.58315	11.99142	.91268	472.4	.966	.56176	11.55164	.94635	474.0	.970	.56376	11.59276	.94319	
6	0	1.000	.125	495.1	1.017	.58885	12.10869	.90376	482.0	.988	.57317	11.78619	.92834	478.8	.971	.56804	11.64081	.93642	
7	0	1.200	.150	482.0	.988	.57317	11.78619	.92834	474.6	.982	.57031	11.77755	.93264	477.6	.978	.57518	11.62755	.92518	
8	0	1.400	.175	495.0	.996	.57744	11.47414	.92162	480.8	.985	.57031	11.75687	.93059	483.6	.991	.57518	11.82755	.92518	
9	0	1.500	.200	484.4	.973	.57662	11.64482	.92386	479.6	.982	.57031	11.72555	.93044	483.6	.991	.57660	11.85690	.92294	
10	0	1.800	.225	483.4	.990	.57459	11.81510	.92010	480.8	.985	.57174	11.75687	.93059	484.8	.994	.57660	11.85690	.92294	
11	0	2.000	.250	483.2	.990	.57459	11.81551	.92010	480.8	.985	.57174	11.75687	.93059	484.8	.994	.57803	11.88625	.92070	
12	0	2.200	.275	484.4	.993	.57662	11.44482	.92386	480.8	.985	.57174	11.75687	.93059	486.0	.997	.57803	11.88625	.92070	
13	0	2.400	.300	484.4	.993	.57662	11.44482	.92386	480.8	.985	.57174	11.75687	.93059	486.0	.997	.57803	11.88625	.92070	
14	0	2.600	.325	483.2	.990	.57459	11.91551	.92410	480.8	.985	.57174	11.75687	.93059	486.0	.997	.57803	11.88625	.92070	
15	0	2.800	.350	483.2	.990	.57459	11.91551	.92410	479.6	.982	.57031	11.72755	.93264	486.0	.997	.57803	11.88625	.92070	
16	0	3.000	.375	482.0	.988	.57317	11.79619	.92934	479.6	.982	.57031	11.72755	.93264	484.8	.994	.57660	11.85690	.92294	
17	0	3.200	.400	480.8	.985	.57174	11.75687	.93059	477.2	.977	.56746	11.66891	.93733	483.6	.991	.57518	11.82755	.92518	
18	0	3.400	.425	480.8	.985	.57174	11.75687	.93059	477.2	.977	.56746	11.66891	.93733	481.2	.986	.57232	11.76885	.92967	
19	0	3.600	.450	480.8	.985	.57174	11.75687	.93059	476.0	.974	.56604	11.63959	.93959	480.0	.983	.57090	11.73951	.93192	
20	0	3.800	.475	479.6	.982	.57031	11.72755	.93284	471.6	.969	.56319	11.58095	.94140	475.2	.973	.56519	11.62211	.94093	
21	0	4.000	.500	480.8	.985	.57174	11.75687	.93059	472.4	.966	.56176	11.55164	.94635	472.8	.967	.56233	11.56341	.94545	
22	0	4.200	.525	479.0	.961	.55891	11.49300	.95080	465.2	.950	.55320	11.37572	.95994	466.8	.940	.54806	11.26993	.96815	
23	0	4.400	.550	455.6	.929	.51808	11.41117	.97818	447.2	.910	.51382	10.91594	.99427	441.6	.897	.52522	10.80035	1.00497	
24	180	.200	.025	741.0	1.568	.88122	18.12083	.42888	732.6	1.549	.87121	17.91491	.44821	706.0	1.489	.83966	17.26614	.50596	
25	180	.400	.050	796.3	1.691	.94703	19.47401	.27993	783.1	1.662	.93129	19.15042	.32052	739.7	1.565	.87971	18.08973	.43184	
26	180	.600	.075	836.0	1.780	.99423	20.44477	.00902	815.6	1.735	.96992	19.94468	.20935	755.4	1.600	.89830	18.47212	.39444	
27	180	.800	.100	845.6	1.802	.010568	20.68010	.00000	820.4	1.745	.97564	20.06234	.18804	760.2	1.611	.90403	18.58978	.38241	
28	180	1.000	.125	849.2	1.810	.010997	20.76835	.00000	825.2	1.756	.98136	20.18001	.18417	763.8	1.619	.90832	18.67802	.37320	
29	180	1.200	.150	850.4	1.813	.011040	20.79777	.00000	827.6	1.762	.98422	20.23885	.15091	765.0	1.621	.90975	18.70743	.37009	
30	180	1.400	.175	855.6	1.813	.011040	20.79777	.00000	827.6	1.762	.98422	20.23885	.15091	766.2	1.624	.91118	18.73685	.36696	
31	180	1.600	.200	856.4	1.813	.011040	20.79777	.00000	827.6	1.762	.98422	20.23885	.15091	766.2	1.624	.91118	18.73685	.36696	
32	180	1.800	.225	849.2	1.810	.010997	20.76835	.00000	826.4	1.759	.98279	20.20943	.15067	765.0	1.621	.90975	18.70743	.37009	
33	180	2.000	.250	848.0	1.807	.010854	20.73893	.00000	824.0	1.753	.97993	20.15060	.17043	763.8	1.619	.88382	18.67802	.37320	
34	180	2.200	.275	845.6	1.802	.010568	20.64010	.00000	821.6	1.748	.97777	20.03237	.18235	761.4	1.613	.89546	18.6119	.37936	
35	180	2.400	.300	843.2	1.802	.010282	20.62127	.00000	819.2	1.733	.97421	20.03233	.18037	757.8	1.605	.89717	18.4705	.38446	
36	180	2.600	.325	839.6	1.784	.01053	20.53302	.04050	815.6	1.735	.96992	19.94468	.20935	759.1	1.597	.89607	18.44270	.37940	
37	180	2.800	.350	836.0	1.780	.01023	20.47477	.03092	812.0	1.727	.96562	19.85643	.22111	761.1	1.592	.89401	18.39388	.40228	
38	180	3.000	.375	830.0	1.767	.00970	20.29748	.03164	801.1	1.716	.95990	19.73974	.24250	744.9	1.581	.88829	18.26622	.41487	
39	180	3.200	.400	824.0	1.753	.00793	18.10804	.01703	801.1	1.703	.95276	19.50167	.24837	740.9	1.567	.88114	18.11915	.42904	
40	180	3.400	.425	815.6	1.735	.00962	19.94468	.02035	793.9	1.686	.94417	19.15117	.24767	731.3	1.546	.86970	17.88383	.45108	
41	180	3.600	.450	804.7	1.710	.00574	19.67992	.025124	783.1	1.652	.93129	19.15042	.32052	722.9	1.527	.85968	17.67794	.46981	
42	180	3.800	.475	791.5	1.681	.00433	19.35634	.02953	769.9	1.632	.91555	18.92683	.35726	710.8	1.500	.84538	17.39379	.49579	
43	180	4.000	.500	772.3	1.638	.01842	19.88567	.03081	749.4	1.586	.89124	18.32675	.40894	692.8	1.460	.82392	16.94258	.53337	
44	180	4.200	.525	736.0	1.554	.07407	17.97374	.044275	712.1	1.503	.84686	17.41482	.49309	657.9	1.382	.78244	16.09957	.60254	
45	180	4.400	.550	679.6	1.430	.08704	17.32126	.053270	656.8	1.379	.78108	16.06164	.60475	607.4	1.268	.72236	14.85417	.69777	
46	90	1.000	.125	589.4	1.227	.01987	.40859	.321216	16.7	.054	.01987	.40859	.321216	16.4	.978	.56804	11.60081	.93642	
47	90	2.000	.250	592.3	1.235	.01034	14.48352	.27570	520.3	1.073	.61879	12.72439	.85729	486.0	.997	.57803	11.88625	.92070	
48	90	3.000	.375	583.9	1.216	.01261	25929	.352750	10.8	.067	.01280	.26322	.351688	10.8	.067	.57518	11.82755	.92518	
49	90	4.000	.500	547.9	1.135	.01356	27894	.347607	11.4	.066	.01356	.27894	.347607	11.4	.066	.01336	.27474	3.46872	
50	270	1.000	.125	589.4	1.228	.01007	14.41429	.27090	679.6	1.430	.067	.01280	.26322	.351688	10.8	.067	.01279	.26297	3.51757
51	270	2.000	.250	593.0	1.236	.01261	25929	.352750	10.8	.067	.01280	.26322	.351688	10.8	.067	.01279	.27867	3.47675	
52	270	3.000	.375	585.8	1.220	.01223	14.50255	.27427	682.0	1.436	.067	.01242	.25537	.353269	10.6	.068	.01260	.25904	3.52818
53	270	4.000	.500	549.7	1.139	.01636	13.44354	.080347	619.5	1.296	.07364	15.14972	.67534	692.8	1.460	.08239	16.94258	.53337	
54	0	4.877	.610	16.7	-.054	.01987	.40859	.321216	16.7	-.054	.01987	.40859	.321216	16.4	-.055	.01947	.40034	3.22606	
55	0	5.402	.675	11.4	-.066	.01261	25929	.352750	10.8	-.067	.01280	.26322	.351688	10.8	-.067	.01279	.26297	3.51757	
56	0	5.927	.741	10.6	-.068	.012													

TABLE II.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_{\infty} = 3.95$  - Concluded(e)  $\alpha = 20^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ$ , $p_t = 5807.1$ psf					$\phi = 90.0^\circ$ , $p_t = 5807.1$ psf					
			$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	
1	0	.000	.000	634.1	1.328	.75410	15.50681	.64799	635.3	1.331	.75553	15.53612	.64573
2	0	.200	.025	592.1	1.234	.70421	14.48084	.72590	628.1	1.315	.74697	15.36024	.65925
3	0	.400	.050	531.0	1.097	.63151	12.98585	.83768	600.5	1.253	.71419	14.48603	.71046
4	0	.600	.075	520.2	1.073	.61868	12.72203	.85746	592.1	1.234	.70421	14.48084	.72590
5	0	.800	.100	516.6	1.065	.61440	12.63409	.86407	589.7	1.229	.70136	14.42221	.73030
6	0	1.000	.125	514.2	1.060	.61155	12.57546	.86848	588.5	1.226	.69993	14.39290	.73250
7	0	1.200	.150	510.6	1.052	.60727	12.48752	.87511	583.8	1.216	.69423	14.27564	.74129
8	0	1.400	.175	517.8	1.068	.61583	12.66340	.86187	589.7	1.229	.70136	14.42221	.73030
9	0	1.600	.200	517.8	1.068	.61583	12.66340	.86187	590.9	1.232	.70278	14.45152	.72810
10	0	1.800	.225	520.2	1.073	.61868	12.72203	.85746	592.1	1.234	.70421	14.48084	.72590
11	0	2.000	.250	520.2	1.073	.61868	12.72203	.85746	592.1	1.234	.70421	14.48084	.72590
12	0	2.200	.275	521.4	1.076	.62010	12.75135	.85526	592.1	1.234	.70421	14.48084	.72590
13	0	2.400	.300	521.4	1.076	.62010	12.75135	.85526	592.1	1.234	.70421	14.48084	.72590
14	0	2.600	.325	521.4	1.076	.62010	12.75135	.85526	590.9	1.232	.70278	14.45152	.72810
15	0	2.800	.350	520.2	1.073	.61868	12.72203	.85746	588.5	1.226	.69993	14.39290	.73250
16	0	3.000	.375	519.0	1.071	.61725	12.69272	.85967	586.1	1.221	.69708	14.33427	.73690
17	0	3.200	.400	515.4	1.063	.61297	12.60478	.86628	582.6	1.213	.69280	14.24633	.74349
18	0	3.400	.425	514.2	1.060	.61155	12.57546	.86848	577.8	1.202	.68710	14.12908	.75226
19	0	3.600	.450	509.4	1.049	.60585	12.45821	.87732	571.8	1.189	.67997	13.98251	.76322
20	0	3.800	.475	503.4	1.036	.59872	12.31164	.88838	562.2	1.167	.66857	13.74800	.78074
21	0	4.000	.500	497.4	1.022	.59159	12.16508	.89948	551.4	1.143	.65574	13.48418	.80043
22	0	4.200	.525	480.7	.985	.57163	11.75469	.93076	526.2	1.087	.62580	12.86860	.84647
23	0	4.400	.550	454.3	.926	.54027	11.10979	.98064	490.3	1.006	.58304	11.98920	.91285
24	180	.200	.025	668.2	1.405	.79470	16.34159	.58249	630.4	1.320	.74971	15.41658	.65493
25	180	.400	.050	674.2	1.418	.80186	16.48811	.57064	600.3	1.253	.71388	14.67965	.71094
26	180	.600	.075	673.0	1.415	.80042	16.45936	.57302	588.2	1.226	.69954	14.38487	.73310
27	180	.800	.100	674.2	1.418	.80186	16.48881	.57064	584.6	1.217	.69524	14.29644	.73973
28	180	1.000	.125	675.5	1.421	.80329	16.51825	.56826	587.0	1.223	.69811	14.35540	.73531
29	180	1.200	.150	677.9	1.426	.80615	16.57714	.56348	588.2	1.226	.69954	14.3H487	.73310
30	180	1.400	.175	680.3	1.432	.80902	16.63603	.55868	590.6	1.231	.70241	14.44383	.72868
31	180	1.600	.200	677.9	1.426	.80615	16.57714	.56348	588.2	1.226	.69954	14.38487	.73310
32	180	1.800	.225	680.3	1.432	.80902	16.63603	.55868	590.6	1.231	.70241	14.44383	.72868
33	180	2.000	.250	677.9	1.426	.80615	16.57714	.56348	588.2	1.226	.69954	14.38487	.73310
34	180	2.200	.275	676.7	1.424	.80472	16.54770	.56587	590.6	1.231	.70241	14.44383	.72868
35	180	2.400	.300	671.8	1.413	.79899	16.42992	.57539	585.8	1.220	.69667	14.32592	.73752
36	180	2.600	.325	669.4	1.407	.79613	16.37103	.58013	585.8	1.220	.69667	14.32592	.73752
37	180	2.800	.350	669.4	1.407	.79613	16.37103	.58013	585.8	1.220	.69667	14.32592	.73752
38	180	3.000	.375	664.6	1.397	.79040	16.25325	.58955	582.2	1.212	.69237	14.23749	.74415
39	180	3.200	.400	659.8	1.386	.78467	16.13548	.59891	579.8	1.207	.68951	14.17853	.74856
40	180	3.400	.425	651.4	1.367	.77465	15.92937	.61515	573.8	1.193	.68234	14.03115	.75959
41	180	3.600	.450	644.1	1.351	.76606	15.75270	.62895	567.7	1.180	.67517	13.88376	.77060
42	180	3.800	.475	633.3	1.327	.75317	15.48770	.64946	560.5	1.163	.66657	13.70690	.78381
43	180	4.000	.500	620.1	1.297	.73742	15.16381	.67427	548.4	1.136	.65224	13.41213	.80581
44	180	4.200	.525	586.4	1.221	.69733	14.33937	.73652	524.3	1.082	.62357	12.82258	.84992
45	180	4.400	.550	543.0	1.124	.64578	13.27938	.81573	490.6	1.007	.58343	11.99722	.91224
46	90	1.000	.125	481.9	.987	.57306	11.78400	.92851	495.0	1.017	.58874	12.10645	.90393
47	90	2.000	.250	481.9	.987	.57306	11.78400	.92851	484.3	.993	.57591	11.84263	.92403
48	90	3.000	.375	480.7	.985	.57163	11.75469	.93076	481.9	.987	.57306	11.78400	.92851
49	90	4.000	.500	471.1	.963	.56023	11.52018	.94878	477.1	.977	.56736	11.66675	.93750
50	270	1.000	.125	826.0	1.758	.98227	20.19879	.16005	849.8	1.811	1.01061	20.78143	.00000
51	270	2.000	.250	824.8	1.755	.98084	20.16935	.16647	849.8	1.811	1.01061	20.78143	.00000
52	270	3.000	.375	806.7	1.715	.95936	19.72768	.24417	830.5	1.768	.98767	20.30979	.13324
53	270	4.000	.500	750.1	1.588	.89206	18.34380	.40726	772.6	1.638	.91886	18.89488	.34979
54	0	4.877	.610	16.0	-.056	.01907	.39221	.324006	16.1	-.056	.01910	.39276	3.23911
55	0	5.402	.675	10.9	-.067	.01297	.26671	.3.50761	10.9	-.067	.01299	.26708	3.50663
56	0	5.927	.741	10.4	-.068	.01240	.25494	.3.53947	10.6	-.068	.01261	.25922	3.52769
57	0	6.452	.807	11.4	-.066	.01354	.27847	.3.47725	11.4	-.066	.01356	.27886	3.47626
58	0	6.977	.872	10.6	-.068	.01259	.25886	.3.52868	10.6	-.068	.01261	.25922	3.52769
59	180	6.977	.872	10.4	-.068	.01240	.25494	.3.53947	10.4	-.068	.01242	.25530	3.53848
60	180	6.452	.807	10.4	-.068	.01240	.25494	.3.53947	10.4	-.068	.01242	.25530	3.53848
61	180	5.927	.741	10.4	-.068	.01240	.25494	.3.53947	10.4	-.068	.01242	.25530	3.53848
62	180	5.402	.675	10.4	-.068	.01240	.25494	.3.53947	10.4	-.068	.01242	.25530	3.53848
63	180	4.877	.610	10.4	-.068	.01240	.25494	.3.53947	10.4	-.068	.01242	.25530	3.53848

\*The following conversion factors can be used to convert these data to the International System of Units:

1 inch = 25.4 mm; 1 psf = 47.88 N/m<sup>2</sup>.

TABLE III.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_{\infty} = 4.63$ (a)  $\alpha = 0^\circ$ 

Orifice	$\theta$ , deg	s, in.	s/d	$\phi = 0.0^\circ$ , $p_t = 7923.4$ psf					$\phi = 22.5^\circ$ , $p_t = 7923.4$ psf					$\phi = 45.0^\circ$ , $p_t = 7914.7$ psf				
				$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$
1	0	.000	.000	660.5	1.828	28.33495	.00000	661.9	1.825	1.01164	28.31615	.00000	664.1	1.834	1.01614	28.31793	.00000	
2	0	.200	.025	649.7	1.791	.99313	27.47213	.00928	651.1	1.795	.99515	27.92874	.04339	653.3	1.803	.99943	28.05465	.02388
3	0	.400	.050	625.8	1.722	.95648	26.44364	.25291	625.9	1.723	.95666	26.44862	.25238	629.3	1.734	.96295	27.02512	.23287
4	0	.600	.075	614.2	1.695	.94182	25.43224	.29387	614.3	1.695	.94200	26.43715	.29341	620.9	1.710	.95011	26.66478	.27138
5	0	.800	.100	610.2	1.678	.93266	24.17512	.31715	610.1	1.678	.93280	24.17998	.31673	613.7	1.690	.93911	26.35592	.30094
6	0	1.000	.125	603.0	1.657	.92167	25.46557	.34336	604.3	1.661	.92367	25.92281	.33871	607.7	1.673	.92993	26.09854	.32382
7	0	1.200	.150	597.0	1.640	.91251	25.61945	.36044	598.1	1.644	.91451	25.66564	.35960	600.5	1.652	.91893	25.78968	.34956
8	0	1.400	.175	592.2	1.626	.90518	25.40375	.37995	593.5	1.630	.90718	25.45990	.37566	594.5	1.635	.90976	25.51230	.37007
9	0	1.600	.200	588.6	1.616	.89968	25.24948	.39157	589.9	1.620	.90168	25.30560	.38737	590.9	1.625	.90426	25.37787	.38192
10	0	1.800	.225	585.0	1.606	.89418	25.09520	.40294	586.1	1.606	.89435	25.09986	.40260	585.0	1.607	.89508	25.12049	.40109
11	0	2.000	.250	580.2	1.592	.88685	24.88951	.41775	581.5	1.596	.88885	24.94556	.41375	581.4	1.597	.88958	24.96606	.41228
12	0	2.200	.275	576.6	1.582	.88136	24.71523	.42662	577.9	1.585	.88335	24.79126	.42469	576.6	1.583	.88225	24.76015	.42687
13	0	2.400	.300	571.8	1.568	.87403	24.52953	.44283	573.1	1.572	.87602	24.54552	.43999	573.0	1.573	.87674	24.60573	.43760
14	0	2.600	.325	567.0	1.554	.86676	24.32384	.45674	568.3	1.558	.86869	24.37978	.45298	568.2	1.559	.86991	24.39982	.45163
15	0	2.800	.350	562.2	1.541	.85937	24.11814	.47039	563.5	1.544	.86136	24.17405	.46670	563.4	1.546	.86207	24.19391	.46539
16	0	3.000	.375	556.2	1.523	.85021	23.86101	.48711	558.7	1.531	.85403	23.96831	.48018	557.4	1.529	.85290	23.93653	.48224
17	0	3.200	.400	549.0	1.503	.83921	23.55247	.50675	551.5	1.510	.84303	23.65971	.49997	550.2	1.508	.84189	23.62767	.50200
18	0	3.400	.425	541.8	1.482	.82822	23.24392	.52596	544.7	1.489	.83204	23.35110	.51933	543.0	1.487	.83089	23.31882	.52133
19	0	3.600	.450	532.3	1.455	.81356	22.83252	.55102	536.0	1.466	.81921	22.99106	.54143	534.6	1.463	.81805	22.95848	.53431
20	0	3.800	.475	521.5	1.424	.79707	22.36970	.57857	524.0	1.431	.80088	22.47672	.57226	522.6	1.429	.79971	22.44372	.57421
21	0	4.000	.500	509.5	1.390	.77875	21.45546	.60854	512.0	1.397	.78256	21.96238	.60236	510.6	1.395	.78136	21.92895	.60249
22	0	4.200	.525	494.3	1.318	.74627	20.77554	.66980	488.8	1.325	.74467	20.88242	.66382	484.3	1.319	.74101	20.79647	.66863
23	0	4.400	.550	484.9	1.208	.68163	19.12995	.76067	484.4	1.215	.68549	19.23837	.75848	484.1	1.213	.68415	19.20070	.75680
24	0	4.600	.575	653.1	1.800	.98829	28.41700	.04939	655.4	1.807	.04018	28.41500	.06000	656.2	1.811	.04040	28.17975	.00000
25	180	.400	.025	611.5	1.759	.95267	27.17831	.22551	613.7	1.745	.95402	27.1389	.21382	613.3	1.744	.95009	27.19734	.21223
26	180	.600	.050	620.5	1.714	.95332	26.72113	.25677	622.6	1.714	.95202	26.71834	.25697	623.7	1.716	.95335	26.71839	.25573
27	180	.800	.100	615.8	1.694	.94130	26.41755	.29524	616.8	1.697	.94279	26.45944	.29132	617.7	1.701	.94514	26.52516	.28507
28	180	1.000	.125	609.8	1.677	.92311	26.15987	.31862	610.8	1.679	.93357	26.20554	.31492	610.4	1.680	.93468	26.21492	.31364
29	180	1.200	.150	605.0	1.663	.92475	25.95318	.33617	605.9	1.666	.92619	25.99424	.33279	605.6	1.667	.92671	26.00810	.31355
30	180	1.400	.175	600.2	1.649	.91704	25.74679	.35311	599.9	1.648	.91699	25.74552	.35410	599.8	1.646	.91566	25.69786	.35703
31	180	1.600	.200	595.4	1.635	.91005	25.54041	.36394	597.7	1.645	.91512	25.61872	.36824	593.6	1.632	.90829	25.49104	.37326
32	180	1.800	.225	590.6	1.622	.90269	25.33402	.38524	591.5	1.624	.90405	25.37207	.38236	588.8	1.618	.90092	25.29422	.38898
33	180	2.000	.250	585.8	1.608	.89534	25.12763	.40057	586.6	1.610	.89667	25.16495	.39783	583.9	1.605	.89355	25.07739	.40423
34	180	2.200	.275	583.4	1.601	.89166	25.02444	.40807	583.0	1.600	.89113	25.09961	.40914	580.3	1.594	.88802	24.92237	.41541
35	180	2.400	.300	577.3	1.584	.88247	24.76465	.42643	577.0	1.583	.88191	24.75071	.42753	574.3	1.577	.87881	24.66374	.43359
36	180	2.600	.325	571.3	1.567	.87328	24.50847	.44226	574.6	1.576	.87822	24.67175	.43747	569.5	1.563	.87144	24.45692	.44777
37	180	2.800	.350	566.5	1.553	.86592	24.30208	.45820	566.1	1.552	.86530	24.24646	.45936	563.5	1.546	.86223	24.19839	.46509
38	180	3.000	.375	560.5	1.536	.85673	24.04410	.47524	561.3	1.538	.85792	24.07757	.47305	557.5	1.529	.85302	23.93986	.48202
39	180	3.200	.400	554.5	1.518	.84754	23.78612	.49192	555.7	1.521	.84870	23.81867	.49893	551.4	1.512	.84381	23.61133	.49860
40	180	3.400	.425	547.3	1.498	.83651	23.47654	.51151	548.6	1.496	.84378	23.45622	.51278	543.0	1.487	.83091	23.31939	.52130
41	180	3.600	.450	537.6	1.470	.82180	23.06376	.53701	538.3	1.472	.82287	23.03976	.53518	535.8	1.467	.81985	23.00915	.54033
42	180	3.800	.475	526.8	1.439	.80525	22.59939	.56498	527.5	1.441	.80626	22.67774	.56329	523.7	1.432	.80143	22.49209	.57135
43	180	4.000	.500	513.6	1.402	.78503	22.01913	.59833	513.0	1.400	.78412	22.00638	.59980	509.3	1.391	.77932	21.47162	.60760
44	180	4.200	.525	487.1	1.326	.74458	20.89670	.66302	487.7	1.327	.74538	20.91901	.66176	482.6	1.315	.73879	20.73409	.67212
45	180	4.400	.550	452.2	1.226	.69127	19.40039	.74585	452.6	1.227	.69187	19.41740	.74492	447.9	1.215	.68536	19.23462	.75494
46	90	1.000	.125	607.8	1.671	.92900	26.07227	.32608	605.5	1.664	.92551	25.97424	.33404	606.5	1.669	.92810	26.04707	.32823
47	90	2.000	.250	582.6	1.599	.89052	24.99236	.41039	581.5	1.596	.88885	24.94556	.41375	581.4	1.597	.88958	24.96606	.41228
48	90	3.000	.375	556.2	1.523	.85021	23.86101	.48711	555.1	1.520	.84853	23.81401	.49013	555.0	1.522	.84923	23.83358	.48888
49	90	4.000	.500	505.9	1.380	.77325	21.70118	.61741	504.4	1.376	.77156	21.55377	.62013	504.6	1.378	.77219	21.61757	.61911
50	270	1.000	.125	607.4	1.670	.92843	26.05637	.32744	610.4	1.679	.93357	26.20054	.31492	612.8	1.687	.93777	26.31833	.30437
51	270	2.000	.250	584.6	1.604	.89356	25.47604	.40433	586.6	1.610	.89667	25.16496	.39783	586.4	1.611	.89723	25.80880	.39666
52	270	3.000	.375	559.3	1.532	.87889	23.99250	.50433	561.1	1.534	.89792	24.07757	.47305	559.0	1.536	.89567	24.04327	.47530
53	270	4.000	.500	511.2	1.335	.78135	21.92863	.60431	510.4	1.336	.78958	21.66100	.60889	511.7	1.339	.78301	21.79750	.60162
54	0	4.877	.610	147.4	-0.225	.63337	3.12799	14.7	-0.025	3.02245	3.03003	3.12937	14.5	-0.025	3.0215	.62154	3.13843	
55	0	5.142	.675	9.5	-0.039	.01451	4.0734	9.3	-0.040	.01424	.99070</							

TABLE III.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 4.63$  - Continued(a)  $\alpha = 0^\circ$  - Concluded

Orifice $\theta$ , deg s, in.	s/d	$\phi = 67.5^\circ, p_t = 7914.7 \text{ psf}$					$\phi = 90.0^\circ, p_t = 7914.7 \text{ psf}$						
		$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$		
1	0	.000	.000	663.9	1.833	1.01595	28,51265	+00000	663.9	1.833	1.01595	28,51265	.00000
2	0	.200	.025	654.4	1.806	1.00128	29,10092	.00000	655.6	1.809	1.00312	28,15238	.00000
3	0	.400	.050	630.4	1.737	.96461	27,07158	.22748	632.8	1.744	.96827	27,17451	.21511
4	0	.600	.075	620.8	1.710	.96493	26,65984	.27187	623.2	1.717	.95360	26,76278	.26140
5	0	.800	.100	613.6	1.689	.93893	26,35104	.30139	616.0	1.696	.94260	26,45398	.29183
6	0	1.000	.125	607.6	1.672	.92976	26,09371	.32423	608.8	1.676	.93160	26,14518	.31977
7	0	1.200	.150	600.4	1.652	.91876	25,78491	.35003	601.6	1.655	.92059	25,83637	.34584
8	0	1.400	.175	596.8	1.641	.91326	25,63051	.36238	596.8	1.641	.91326	25,63051	.36238
9	0	1.600	.200	593.2	1.631	.90776	25,47611	.37441	594.4	1.635	.90959	25,52757	.37044
10	0	1.800	.225	587.2	1.614	.88959	25,21877	.39385	588.4	1.617	.90042	25,27024	.39002
11	0	2.000	.250	581.2	1.597	.88942	24,96144	.41261	583.6	1.604	.89309	25,06437	.40518
12	0	2.200	.275	577.7	1.587	.88392	24,80704	.42358	580.0	1.593	.88758	24,90997	.41629
13	0	2.400	.300	572.9	1.573	.87658	24,60117	.43791	575.3	1.580	.88025	24,70410	.43079
14	0	2.600	.325	568.1	1.559	.86925	24,39530	.45194	570.5	1.566	.87291	24,49824	.44496
15	0	2.800	.350	562.1	1.542	.86008	24,13797	.46908	565.7	1.552	.86558	24,29237	.45884
16	0	3.000	.375	556.1	1.525	.85091	23,88063	.48585	558.5	1.532	.85457	23,98357	.47919
17	0	3.200	.400	550.1	1.508	.84174	23,62330	.50228	552.5	1.514	.84540	23,72623	.49574
18	0	3.400	.425	541.7	1.484	.82890	23,26303	.52478	544.1	1.490	.83257	23,36596	.51841
19	0	3.600	.450	533.3	1.460	.81606	22,90276	.54678	534.5	1.463	.81790	22,95423	.54367
20	0	3.800	.475	521.3	1.425	.79772	22,38809	.57749	523.7	1.432	.80139	22,49103	.57141
21	0	4.000	.500	509.3	1.391	.77939	21,47342	.60750	510.5	1.394	.78122	21,92489	.60452
22	0	4.200	.525	485.4	1.322	.74271	20,84409	.66596	485.4	1.322	.74271	20,84409	.66596
23	0	4.400	.550	447.0	1.213	.68403	19,19715	.75699	447.0	1.213	.68403	19,19715	.75699
24	180	.200	.025	653.7	1.804	1.00022	28,07114	.00000	653.7	1.804	1.00022	28,07114	.00000
25	180	.400	.050	633.2	1.745	.96891	27,19230	.21290	628.4	1.732	.96154	26,98551	.23737
26	180	.600	.075	621.2	1.711	.95049	26,67534	.27032	620.0	1.708	.94864	26,62364	.27547
27	180	.800	.100	613.9	1.690	.93943	26,36516	.30009	612.7	1.687	.93759	26,31346	.30481
28	180	1.000	.125	607.9	1.673	.93022	26,10668	.32311	605.5	1.666	.92654	26,00328	.33195
29	180	1.200	.150	601.9	1.656	.92101	25,84819	.34487	599.5	1.649	.91733	25,74480	.35327
30	180	1.400	.175	597.1	1.642	.91365	25,64141	.36152	597.1	1.642	.91365	25,64141	.36152
31	180	1.600	.200	591.1	1.625	.90444	25,38293	.38154	588.7	1.618	.90075	25,27953	.38933
32	180	1.800	.225	586.2	1.611	.89707	25,17614	.39700	585.0	1.608	.89523	25,12444	.40080
33	180	2.000	.250	581.4	1.597	.88970	24,96936	.41204	579.0	1.590	.88602	24,86596	.41942
34	180	2.200	.275	577.8	1.587	.88417	24,81427	.42307	575.4	1.580	.88049	24,71087	.43032
35	180	2.400	.300	571.8	1.570	.87496	24,55578	.44103	569.4	1.563	.87128	24,45239	.44808
36	180	2.600	.325	564.6	1.549	.86391	24,24561	.46196	564.6	1.549	.86391	24,24561	.46196
37	180	2.800	.350	559.8	1.535	.85654	24,03882	.47559	559.8	1.535	.85654	24,03882	.47559
38	180	3.000	.375	553.7	1.518	.84733	23,78034	.49229	553.7	1.518	.84733	23,78034	.49229
39	180	3.200	.400	547.7	1.501	.83812	23,52186	.50867	547.7	1.501	.83812	23,52186	.50867
40	180	3.400	.425	540.5	1.480	.82707	23,21168	.52795	538.1	1.473	.82339	23,10289	.53429
41	180	3.600	.450	530.9	1.453	.81233	22,79811	.55309	529.7	1.449	.81049	22,76461	.55620
42	180	3.800	.475	521.2	1.425	.79760	22,43845	.57770	518.8	1.418	.79391	22,28114	.58378
43	180	4.000	.500	506.8	1.384	.77549	21,76418	.61379	505.6	1.380	.77365	21,71248	.61676
44	180	4.200	.525	481.5	1.311	.73681	20,67855	.67522	480.3	1.308	.73497	20,62686	.67810
45	180	4.400	.550	446.6	1.211	.68339	19,17936	.75797	445.4	1.208	.68155	19,12766	.76080
46	90	1.000	.125	605.2	1.665	.92609	25,99077	.33031	606.4	1.669	.92793	26,04224	.32865
47	90	2.000	.250	581.2	1.597	.88942	24,96144	.41261	582.4	1.600	.89125	25,01290	.40891
48	90	3.000	.375	556.1	1.525	.85091	23,89063	.48585	557.3	1.528	.85274	23,93210	.48252
49	90	4.000	.500	508.1	1.388	.77755	21,82196	.61047	509.3	1.391	.77939	21,87342	.60750
50	270	1.000	.125	612.7	1.687	.93759	26,31346	.30481	613.9	1.690	.93943	26,36516	.30009
51	270	2.000	.250	587.4	1.615	.89891	25,22784	.39318	589.9	1.621	.90259	25,33123	.38545
52	270	3.000	.375	562.2	1.542	.86023	24,14221	.46880	562.2	1.542	.86023	24,14221	.46880
53	270	4.000	.500	512.8	1.401	.78470	22,02266	.59886	514.0	1.404	.78655	22,07436	.59586
54	0	4.877	.610	14.5	.025	.02216	.62190	3,13815	14.3	.026	.02191	.61481	3,14590
55	0	5.402	.675	9.1	-.041	.01388	.38954	3,45996	8.9	-.041	.01363	.38255	3,47266
56	0	5.927	.741	8.8	-.042	.01339	.37587	3,48503	8.4	-.043	.01290	.36206	3,51139
57	0	6.452	.807	8.6	-.042	.01315	.36904	3,49793	8.3	-.043	.01266	.35522	3,52483
58	0	6.977	.872	8.4	-.043	.01291	.36220	3,51110	8.0	-.044	.01217	.34156	3,55258
59	180	6.977	.872	7.8	-.044	.01193	.33487	3,56661	8.0	-.044	.01217	.34156	3,55258
60	180	6.452	.807	7.8	-.044	.01193	.33487	3,56661	8.0	-.044	.01217	.34156	3,55258
61	180	5.927	.741	7.8	-.044	.01193	.33487	3,56661	8.0	-.044	.01217	.34156	3,55258
62	180	5.402	.675	7.8	-.044	.01193	.33487	3,56661	8.0	-.044	.01217	.34156	3,55258
63	180	4.877	.610	7.8	-.044	.01193	.33487	3,56661	8.0	-.044	.01217	.34156	3,55258

\*The following conversion factors can be used to convert these data to the International System of Units:

1 inch  $\equiv$  25.4 mm; 1 psf  $\equiv$  47.88 N/m<sup>2</sup>.

TABLE III.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 4.63$  - Continued(b)  $\alpha = 5^\circ$ 

Orifice	$\theta$ , deg	s, in.	s/d	$\phi = 0.0^\circ$ , $p_t = 7923.4$ psf						$\phi = 22.5^\circ$ , $p_t = 7923.4$ psf						$\phi = 45.0^\circ$ , $p_t = 7914.7$ psf					
				$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$			
1	0	.000	.000	641.3	1.767	.98030	27.51216	1.6882	.98223	27.56614	1.6026	643.6	1.775	.98487	27.64027	.14775					
2	0	.200	.025	609.0	1.674	.93083	26.12370	3.2164	611.4	1.681	.93458	26.22898	3.1240	617.3	1.700	.94452	26.50790	.24672			
3	0	.400	.050	563.4	1.544	.86120	24.16956	4.6700	568.3	1.558	.86861	24.37752	4.5314	574.9	1.590	.88583	24.86081	.41978			
4	0	.600	.075	564.6	1.547	.86303	24.22099	4.6360	568.1	1.558	.86861	24.37752	4.5314	576.5	1.583	.88216	24.75786	.42703			
5	0	.800	.100	563.4	1.544	.86120	24.16956	4.6700	565.9	1.551	.86495	24.27466	4.6003	574.1	1.576	.87850	24.65492	.43420			
6	0	1.000	.125	559.8	1.534	.85570	24.01529	4.7712	562.3	1.541	.85945	24.12038	4.7024	566.9	1.556	.86749	24.34609	.45525			
7	0	1.200	.150	553.8	1.517	.84654	23.75817	4.9371	557.5	1.527	.85212	23.91466	4.8365	564.5	1.549	.86382	24.24315	.46212			
8	0	1.400	.175	550.2	1.506	.84105	23.6389	5.0350	553.9	1.517	.84662	23.76037	4.9357	559.7	1.535	.85649	24.03726	.47569			
9	0	1.600	.200	547.8	1.499	.83738	23.5104	5.0998	550.3	1.506	.84112	23.66068	5.0337	557.3	1.528	.85282	23.93432	.48238			
10	0	1.800	.225	545.4	1.493	.83372	23.39819	5.1640	547.9	1.500	.83746	23.50322	5.0984	553.7	1.518	.84732	23.77990	.49232			
11	0	2.000	.250	541.8	1.482	.82822	23.24392	5.2596	544.3	1.489	.83196	23.34893	5.1946	550.1	1.508	.84182	23.62549	.50214			
12	0	2.200	.275	541.3	1.472	.82272	23.09965	5.3543	541.9	1.482	.82830	23.24608	5.2583	546.5	1.497	.83631	23.47107	.51185			
13	0	2.400	.300	535.9	1.465	.81906	22.98680	5.4169	538.3	1.472	.82286	23.09179	5.3530	542.9	1.487	.83081	23.31666	.52147			
14	0	2.600	.325	532.1	1.455	.81356	22.83252	5.5102	534.7	1.462	.81730	22.93750	5.4468	539.4	1.477	.82531	23.16224	.53098			
15	0	2.800	.350	528.0	1.445	.80703	22.74725	5.6826	531.1	1.452	.81180	22.74321	5.3399	534.6	1.463	.81797	22.95635	.54354			
16	0	3.000	.375	523.0	1.436	.80303	22.62655	5.7250	526.3	1.448	.80447	22.57749	5.6628	528.6	1.446	.80880	22.69900	.55904			
17	0	3.200	.400	519.1	1.417	.79341	22.49615	5.8462	529.5	1.424	.79176	22.37176	5.7845	523.8	1.432	.80147	22.49311	.57129			
18	0	3.400	.425	514.3	1.404	.78608	22.34662	5.9462	515.9	1.407	.77978	22.21663	5.5931	517.8	1.415	.79230	22.23575	.58644			
19	0	3.600	.450	508.3	1.386	.77691	22.18043	6.1150	509.5	1.390	.77882	22.05748	6.0842	510.6	1.395	.78129	21.78692	.60441			
20	0	3.800	.475	499.9	1.362	.76409	21.44406	6.3210	501.1	1.366	.76599	21.49748	6.2906	501.6	1.367	.76662	21.91515	.6205			
21	0	4.000	.500	491.5	1.338	.75126	21.08409	6.4528	491.5	1.339	.75133	21.08604	6.52307	491.6	1.340	.76195	21.18338	.63139			
22	0	4.200	.525	469.9	1.277	.71828	20.15844	7.0411	472.4	1.284	.72201	20.26317	6.9932	471.0	1.281	.72727	20.22836	.64211			
23	0	4.400	.550	436.4	1.181	.66697	18.71855	7.7319	437.6	1.184	.66887	18.77172	7.8028	436.3	1.182	.66758	18.73568	.67225			
24	180	.200	.025	657.5	1.813	1.00493	28.20332	.00000	656.3	1.810	1.00318	28.15428	.00000	651.8	1.799	.89736	27.99083	.60147			
25	180	.400	.050	656.3	1.809	1.00309	28.15166	.00000	656.3	1.792	.99398	28.15958	.00000	646.6	1.778	.88632	27.68097	.61042			
26	180	.600	.075	647.8	1.785	.99021	27.79008	11.4666	644.3	1.775	.98478	27.63768	1.4820	635.0	1.751	.97160	27.26782	.20330			
27	180	.800	.100	645.4	1.778	.98653	27.68677	13.935	637.0	1.755	.97373	27.32773	1.9538	627.7	1.730	.96056	26.95796	.24046			
28	180	1.000	.125	635.8	1.751	.97180	27.27354	20.256	632.2	1.741	.96637	27.12109	2.2161	621.7	1.713	.95136	26.69974	.26786			
29	180	1.200	.150	633.4	1.744	.96812	27.17023	21.564	627.4	1.727	.95901	26.91446	2.4527	618.1	1.702	.94584	26.54481	.28318			
30	180	1.400	.175	627.4	1.727	.95892	26.91916	24.554	621.4	1.710	.94980	26.65616	2.7224	612.1	1.685	.93663	26.28659	.30724			
31	180	1.600	.200	622.5	1.713	.95156	26.70534	26.279	617.8	1.699	.94428	26.50118	2.8736	608.5	1.675	.93111	26.13166	.32095			
32	180	1.800	.225	621.3	1.710	.94972	26.65369	27.249	614.2	1.689	.93876	26.34620	3.0183	604.9	1.664	.92559	25.97673	.33419			
33	180	2.000	.250	614.1	1.689	.93867	26.34376	3.0205	609.1	1.672	.92956	26.08791	3.2473	598.9	1.647	.91639	25.71851	.35538			
34	180	2.200	.275	609.3	1.675	.93131	26.13714	3.2047	603.3	1.658	.92219	25.81217	3.4215	596.5	1.640	.91271	25.61523	.36359			
35	180	2.400	.300	604.5	1.661	.92395	25.93052	3.3046	598.5	1.644	.91493	25.67463	3.5889	590.5	1.623	.90351	25.35701	.38350			
36	180	2.600	.325	598.5	1.644	.91474	25.67225	3.5047	593.7	1.631	.90747	25.46800	3.7504	584.4	1.606	.89431	25.09879	.40267			
37	180	2.800	.350	593.6	1.630	.90938	25.46563	3.7522	588.9	1.617	.90010	25.21636	3.9068	578.4	1.589	.88511	24.84057	.42121			
38	180	3.000	.375	586.4	1.610	.90634	25.21571	3.9451	581.7	1.596	.88906	24.95141	4.1333	572.6	1.572	.87591	24.58235	.43921			
39	180	3.200	.400	560.4	1.593	.8893	24.89744	4.1718	576.7	1.579	.87986	24.69311	4.3155	565.2	1.551	.86487	24.27249	.46017			
40	180	3.400	.425	556.3	1.541	.85953	24.42626	4.7409	557.2	1.555	.86647	24.31349	4.5623	556.6	1.527	.85199	23.91099	.48389			
41	180	3.600	.450	552.3	1.541	.84112	24.04626	5.0337	557.1	1.527	.82452	23.9182	4.8342	544.4	1.503	.83911	23.54948	.50693			
42	180	3.800	.475	550.3	1.506	.81212	23.6607	5.0347	549.5	1.493	.82454	23.41015	5.161	547.9	1.468	.82071	23.03205	.53886			
43	180	4.000	.500	535.8	1.465	.81904	22.98622	5.473	531.1	1.452	.81175	22.72272	5.3048	521.9	1.427	.79562	22.41332	.57600			
44	180	4.200	.525	506.9	1.283	.77484	21.74652	6.1481	503.4	1.372	.76941	21.59256	6.2357	495.5	1.351	.75814	21.27716	.64158			
45	180	4.400	.550	466.0	1.266	.71229	19.98026	7.1341	463.6	1.259	.70867	19.88880	7.0000	457.0	1.241	.69296	19.62457	.73354			
46	90	1.000	.125	586.8	1.616	.89968	25.49498	5.39157	575.9	1.578	.87961	24.68610	4.3204	566.9	1.556	.86749	24.34669	.45525			
47	90	2.000	.250	569.4	1.561	.87034	24.42669	4.4982	557.7	1.530	.85939	23.96609	4.032	549.9	1.504	.83998	23.49401	.50539			
48	90	3.000	.375	545.4	1.493	.83372	23.39819	5.1640	535.9	1.465	.81913	23.28993	5.14156	527.6	1.443	.80697	22.64422	.58211			
49	90	4.000	.500	497.5	1.356	.76042	21.34121	6.3795	491.5	1.339	.75133	21.08604	6.6537	487.8	1.329	.74645	20.48986	.66608			
50	270	1.000	.125	591.2	1.624	.90370	25.36233	3.8310	608.1	1.672	.92956	26.08791	3.2473	624.1	1.720	.95504	26.80303	.25721			
51	270	2.000	.250	572.0	1.568	.87425	24.53585	4.4239	586.5	1.610	.90642	25.15804	3.98933	602.5	1.658	.92191	25.87344	.34279			
52	270	3.000	.375	547.9	1.500	.83744	23.50277	5.0987	561.2	1.538	.85777	24.07320	4.77334	574.8	1.578	.87959	24.69564	.43207			
53	270	4.000	.500	502.1	1.369	.76750	21.53990	6.2664	513.0	1.400	.78414	22.00683	5.9978	524.3	1.434	.80230	22.51661	.56990			
54	0	4.877	.610	15.8	-.021	.02419	.67889	3.07907	15.0	-.024	.02293	.64358	3.15502	14.5	-.025	.02216	.62190	3.13815			

TABLE III.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 4.63$  - Continued(b)  $\alpha = 5^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ, p_t = 7914.7 \text{ psf}$						$\phi = 90.0^\circ, p_t = 7914.7 \text{ psf}$					
			$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$		
1	0	.000	.000	642.4	1.772	.98294	27.58625	.15696	643.1	1.774	.98413	27.61946	.15136	
2	0	.200	.025	624.4	1.720	.95544	26.81424	.25603	633.5	1.746	.96944	27.20723	.21104	
3	0	.400	.050	593.2	1.631	.90776	25.47611	.37441	611.9	1.685	.93639	26.27971	.30786	
4	0	.600	.075	586.0	1.611	.89675	25.16730	.39765	602.3	1.657	.92170	25.86748	.34329	
5	0	.800	.100	581.2	1.597	.88942	24.95144	.41261	596.3	1.640	.91252	25.60983	.36401	
6	0	1.000	.125	575.3	1.580	.88025	24.70410	.43079	590.3	1.623	.90334	25.35219	.38386	
7	0	1.200	.150	570.5	1.566	.87291	24.49824	.44496	584.3	1.606	.89416	25.09454	.40298	
8	0	1.400	.175	566.9	1.556	.86741	24.34383	.45540	580.7	1.595	.88865	24.93996	.41415	
9	0	1.600	.200	564.5	1.549	.86374	24.24690	.46227	578.3	1.589	.88498	24.83690	.42147	
10	0	1.800	.225	560.9	1.539	.85824	24.08650	.47247	573.5	1.575	.87764	24.63078	.43587	
11	0	2.000	.250	557.3	1.528	.85274	23.93210	.48252	569.9	1.564	.87213	24.46760	.44666	
12	0	2.200	.275	553.7	1.518	.84724	23.77770	.49246	566.3	1.554	.86662	24.32161	.45689	
13	0	2.400	.300	548.9	1.504	.83990	23.57183	.50553	561.5	1.540	.85928	24.11550	.47056	
14	0	2.600	.325	545.3	1.494	.83440	23.41743	.51520	559.1	1.534	.85560	24.01244	.47731	
15	0	2.800	.350	540.5	1.480	.82707	23.21156	.52795	554.3	1.520	.84826	23.80632	.49063	
16	0	3.000	.375	535.7	1.466	.81973	23.00570	.54054	547.1	1.499	.83724	23.49715	.51022	
17	0	3.200	.400	528.5	1.446	.80873	22.66689	.55916	539.9	1.479	.82623	23.18798	.52940	
18	0	3.400	.425	522.5	1.429	.79956	22.43956	.57445	532.8	1.458	.81521	22.87880	.54823	
19	0	3.600	.450	515.3	1.408	.78856	22.13076	.59257	524.4	1.434	.80236	22.51810	.56981	
20	0	3.800	.475	504.5	1.377	.77205	21.66756	.61934	513.6	1.403	.78583	22.05434	.59702	
21	0	4.000	.500	495.0	1.350	.75738	21.25582	.64278	501.6	1.369	.76747	21.53905	.62669	
22	0	4.200	.525	472.2	1.285	.72254	20.27795	.69750	477.6	1.300	.73075	20.50848	.68470	
23	0	4.400	.550	436.2	1.182	.66752	18.73394	.78235	439.2	1.190	.67200	18.85955	.77547	
24	180	.200	.025	645.2	1.780	.98733	27.70926	.13510	633.3	1.746	.96900	27.19482	.21259	
25	180	.400	.050	626.0	1.725	.95785	26.89212	.24878	608.0	1.673	.93031	26.10909	.32291	
26	180	.600	.075	616.3	1.697	.94312	26.46855	.29046	598.3	1.646	.91557	25.69548	.35722	
27	180	.800	.100	609.1	1.677	.93207	26.15837	.31862	592.3	1.628	.90636	25.43698	.37742	
28	180	1.000	.125	603.1	1.659	.92286	25.89998	.34061	586.3	1.611	.89715	25.17847	.39683	
29	180	1.200	.150	598.3	1.646	.91549	25.69310	.35741	583.9	1.604	.89347	25.07507	.40440	
30	180	1.400	.175	593.5	1.632	.90812	25.48632	.37363	579.1	1.591	.88610	24.86827	.41925	
31	180	1.600	.200	589.9	1.621	.90259	25.33123	.38545	574.3	1.577	.87873	24.66146	.43375	
32	180	1.800	.225	586.2	1.611	.89707	25.17614	.39700	571.9	1.570	.87504	24.55806	.44087	
33	180	2.000	.250	581.4	1.597	.88970	24.96936	.41204	565.8	1.553	.86583	24.29955	.45836	
34	180	2.200	.275	577.8	1.587	.88417	24.81427	.42307	562.2	1.542	.86031	24.14445	.46866	
35	180	2.400	.300	571.8	1.570	.87496	24.55578	.44103	557.4	1.529	.85294	23.93764	.48217	
36	180	2.600	.325	567.0	1.556	.86760	24.34900	.45505	556.2	1.515	.84557	23.73084	.49545	
37	180	2.800	.350	562.2	1.542	.86023	24.14221	.46880	549.0	1.504	.84004	23.57574	.50528	
38	180	3.000	.375	556.2	1.525	.85102	23.83373	.48565	543.0	1.487	.83083	23.31723	.52143	
39	180	3.200	.400	550.1	1.508	.84181	23.62525	.50215	536.9	1.470	.82162	23.05872	.53732	
40	180	3.400	.425	541.7	1.484	.82891	23.23437	.52476	529.7	1.449	.81057	22.74852	.55607	
41	180	3.600	.450	533.3	1.460	.81602	22.90150	.54686	521.3	1.425	.79767	22.38661	.57758	
42	180	3.800	.475	523.6	1.432	.80128	22.48793	.57159	511.7	1.398	.78293	21.97300	.60174	
43	180	4.000	.500	508.0	1.387	.77734	21.81588	.61082	497.2	1.356	.76083	21.35259	.63730	
44	180	4.200	.525	482.7	1.315	.73865	20.73025	.67233	473.1	1.287	.72398	20.31856	.69525	
45	180	4.400	.550	445.4	1.208	.68155	19.12766	.76680	439.4	1.191	.67240	18.87093	.77485	
46	90	1.000	.125	560.9	1.539	.85824	24.08650	.47247	560.3	1.537	.85744	24.06397	.47394	
47	90	2.000	.250	542.9	1.487	.83073	23.31450	.52160	543.5	1.489	.83173	23.34256	.51986	
48	90	3.000	.375	523.7	1.432	.80139	22.49103	.57141	524.4	1.434	.80236	22.51810	.56981	
49	90	4.000	.500	486.6	1.326	.74454	20.89555	.66308	489.6	1.334	.74911	21.02377	.65588	
50	270	1.000	.125	633.2	1.745	.96891	27.19230	.21290	638.1	1.759	.97637	27.60162	.18517	
51	270	2.000	.250	610.3	1.680	.93391	26.21007	.31407	616.4	1.697	.94321	26.47100	.29023	
52	270	3.000	.375	583.8	1.604	.89338	25.07275	.40457	588.7	1.618	.90084	25.28187	.38915	
53	270	4.000	.500	530.9	1.453	.81233	22.79811	.55309	536.9	1.470	.82162	23.05872	.53732	
54	0	4.877	.610	14.5	-.025	.02215	.62164	3.13843	14.2	-.026	.02166	.60798	3.15347	
55	0	5.402	.675	8.9	-.041	.01363	.38255	3.47266	8.7	-.042	.01339	.37572	3.48532	
56	0	5.927	.741	8.4	-.043	.01290	.36206	3.51139	8.1	-.043	.01241	.34839	3.53856	
57	0	6.452	.807	8.3	-.043	.01266	.35522	3.52483	8.0	-.044	.01217	.34156	3.55258	
58	0	6.977	.872	8.3	-.043	.01266	.35522	3.52483	8.0	-.044	.01217	.34156	3.55258	
59	180	6.977	.872	8.1	-.043	.01241	.34839	3.53456	7.8	-.044	.01193	.33473	3.56690	
60	180	6.452	.807	8.1	-.043	.01241	.34839	3.53856	8.0	-.044	.01217	.34156	3.55258	
61	180	5.927	.741	8.1	-.043	.01241	.34839	3.53856	8.1	-.043	.01241	.34839	3.53856	
62	180	5.402	.675	8.3	-.043	.01266	.35522	3.52483	8.1	-.043	.01241	.34839	3.53856	
63	180	4.877	.610	8.4	-.043	.01290	.36206	3.51139	8.3	-.043	.01266	.35522	3.52483	

\*The following conversion factors can be used to convert these data to the International System of Units:

1 inch = 25.4 mm; 1 psf = 47.88 N/m<sup>2</sup>.

TABLE III.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_{\infty} = 4.63$  - Continued(c)  $\alpha = 10^\circ$ 

Orifice	$\theta, \text{deg}$	s, in.	s/d	$\phi = 0.0^\circ, p_t = 7923.4 \text{ psf}$					$\phi = 22.5^\circ, p_t = 7923.4 \text{ psf}$					$\phi = 45.0^\circ, p_t = 7914.7 \text{ psf}$				
				$p_l, \text{psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l, \text{psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l, \text{psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$
1	0	.000	.000	598.2	1.643	.91434	25.66088	.35998	598.2	1.644	.91442	25.66326	.35979	598.3	1.648	.91701	25.73582	.35399
2	0	.200	.025	544.2	1.489	.83188	23.34677	.51967	547.9	1.500	.83746	23.50322	.50984	558.5	1.532	.85465	23.98579	.47904
3	0	.400	.050	469.9	1.277	.71828	20.15844	.70411	479.6	1.304	.73301	20.57175	.68118	501.0	1.367	.76662	21.51515	.62805
4	0	.600	.075	483.1	1.314	.73043	20.72411	.67268	489.1	1.332	.74767	20.98318	.65916	504.6	1.377	.77212	21.66956	.61922
5	0	.800	.100	497.5	1.356	.76042	21.34121	.63793	494.3	1.352	.75866	21.29176	.64075	504.6	1.377	.77212	21.66956	.61922
6	0	1.000	.125	496.3	1.352	.75859	21.29978	.64086	496.3	1.359	.75866	21.29176	.64075	503.4	1.374	.77029	21.61809	.62217
7	0	1.200	.150	497.3	1.335	.74943	21.03266	.65538	492.7	1.342	.75316	21.13747	.64947	502.7	1.371	.76845	21.56662	.62511
8	0	1.400	.175	490.3	1.335	.74943	21.03266	.65538	492.7	1.342	.75316	21.13747	.64947	499.8	1.364	.76479	21.46368	.63098
9	0	1.600	.200	489.3	1.332	.74760	20.9124	.65927	491.5	1.339	.75133	21.08604	.65237	499.8	1.364	.76479	21.46368	.63098
10	0	1.800	.225	467.0	1.328	.74582	20.92981	.66116	489.3	1.335	.74950	21.03411	.65597	498.6	1.360	.76295	21.41221	.63391
11	0	2.000	.250	487.0	1.328	.74576	20.92981	.66116	489.3	1.332	.74950	20.98318	.65916	498.6	1.360	.76295	21.41221	.63391
12	0	2.200	.275	486.7	1.325	.74593	20.98318	.66144	487.9	1.326	.74593	20.98318	.66105	496.2	1.353	.75926	21.30926	.63376
13	0	2.400	.300	485.5	1.321	.74210	20.82696	.66692	486.7	1.328	.74400	20.88032	.66393	496.2	1.353	.75920	21.30926	.63376
14	0	2.600	.325	486.3	1.318	.74027	20.82654	.66985	485.5	1.321	.74217	20.88090	.66482	494.1	1.340	.75195	21.13338	.65139
15	0	2.800	.350	483.1	1.314	.73843	20.72411	.67268	484.4	1.319	.74034	20.77747	.66369	491.4	1.340	.75195	21.13338	.65139
16	0	3.000	.375	480.7	1.309	.73477	20.62126	.67642	482.0	1.311	.73667	20.67461	.67554	486.6	1.326	.74461	20.89749	.66297
17	0	3.200	.400	479.3	1.301	.73111	20.51842	.68415	479.6	1.304	.73301	20.57175	.68118	485.4	1.323	.74278	20.84602	.66586
18	0	3.400	.425	475.9	1.294	.72744	20.41557	.68986	474.7	1.294	.72751	20.41746	.68876	478.2	1.302	.73177	20.53719	.66310
19	0	3.600	.450	473.5	1.287	.72378	20.31272	.69557	473.6	1.287	.72384	20.31460	.69567	474.6	1.292	.72627	20.38277	.69168
20	0	3.800	.475	468.7	1.273	.71645	20.10702	.70496	467.6	1.270	.71468	20.05746	.70790	467.4	1.271	.71527	20.07394	.70879
21	0	4.000	.500	465.1	1.263	.71095	19.95274	.71548	462.8	1.256	.70735	19.85174	.72104	461.4	1.254	.70610	19.81658	.72298
22	0	4.200	.525	449.5	1.218	.68713	19.28423	.75222	448.8	1.215	.68536	19.23459	.75494	445.9	1.209	.68226	19.14745	.75972
23	0	4.400	.550	422.0	1.140	.64498	18.1046	.81965	420.8	1.134	.64321	18.05171	.81967	415.9	1.124	.63640	17.86066	.83014
24	180	.200	.025	639.4	1.761	.97732	27.42850	.18132	635.8	1.751	.97189	27.27607	.20223	627.2	1.728	.95979	26.93631	.24286
25	180	.400	.050	656.3	1.809	1.00309	28.15166	.00000	647.9	1.785	.99030	27.79266	.11809	632.0	1.742	.96715	27.14312	.21995
26	180	.600	.075	656.3	1.809	1.00309	28.15166	.00000	649.1	1.789	.99214	27.84432	.10624	627.2	1.728	.95979	26.93631	.24286
27	180	.800	.100	653.8	1.803	.99941	28.04836	.02905	645.5	1.779	.98662	27.69343	.13887	622.4	1.715	.95424	26.72951	.24683
28	180	1.000	.125	656.2	1.792	.99389	27.89339	.09363	641.9	1.768	.98110	27.53437	.16353	617.6	1.701	.94505	26.52270	.28530
29	180	1.200	.150	646.6	1.782	.98837	27.73843	.12940	639.5	1.761	.97741	27.41035	.18095	614.0	1.691	.93952	26.34760	.29987
30	180	1.400	.175	644.2	1.775	.98469	27.63512	.14865	633.4	1.744	.96821	27.17275	.21533	610.4	1.680	.93399	26.21250	.31386
31	180	1.600	.200	639.4	1.761	.97732	27.42850	.19132	632.2	1.741	.96637	27.12109	.22161	608.0	1.673	.93031	26.1909	.32291
32	180	1.800	.225	635.8	1.751	.97180	27.17354	.22956	628.6	1.730	.96085	26.96161	.23955	604.4	1.663	.92478	25.95339	.33161
33	180	2.000	.250	632.2	1.741	.96628	27.11858	.22191	625.0	1.720	.95533	26.81114	.25936	600.7	1.653	.91926	25.79889	.34890
34	180	2.200	.275	628.6	1.730	.96076	26.94361	.23983	621.1	1.710	.94980	26.65616	.27224	597.1	1.642	.91373	25.64378	.36133
35	180	2.400	.300	623.7	1.716	.95340	26.75700	.26200	615.4	1.693	.94060	26.39786	.29707	592.3	1.628	.90636	25.43698	.37742
36	180	2.600	.325	624.1	1.708	.94787	26.60203	.27760	610.4	1.679	.93324	26.19123	.31574	587.5	1.615	.89890	25.23017	.39300
37	180	2.800	.350	614.8	1.689	.93077	26.43476	.31285	604.7	1.665	.92587	26.29485	.33476	583.9	1.604	.89347	25.07507	.40464
38	180	3.000	.375	608.1	1.672	.92404	26.08549	.32494	599.7	1.648	.91667	25.72629	.33476	576.7	1.584	.88241	24.76486	.42653
39	180	3.200	.400	599.7	1.649	.91659	25.62301	.30575	593.7	1.631	.90747	25.46379	.37704	571.9	1.570	.87534	24.55818	.44087
40	180	3.400	.425	591.2	1.624	.90730	25.34283	.33832	595.3	1.606	.89548	25.16339	.40212	562.7	1.542	.86731	24.41445	.44866
41	180	3.600	.450	581.6	1.596	.88898	24.99007	.41349	574.6	1.575	.88702	24.84145	.45313	553.9	1.518	.84747	23.42254	.49215
42	180	3.800	.475	569.6	1.562	.87057	24.43255	.41942	563.6	1.545	.86145	24.17652	.44654	548.8	1.484	.82899	22.55553	.52623
43	180	4.000	.500	552.7	1.513	.84480	23.70938	.40682	575.7	1.500	.83752	23.50495	.59733	527.3	1.442	.80889	22.64911	.52225
44	180	4.200	.525	523.8	1.431	.80063	22.46968	.57267	519.0	1.417	.79334	22.26513	.58472	499.6	1.363	.76451	21.45599	.43142
45	180	4.400	.550	481.7	1.310	.73621	20.66177	.67616	474.1	1.300	.73076	20.50871	.68649	459.9	1.250	.70372	19.74985	.72665
46	90	1.000	.125	549.0	1.503	.83921	23.55247	.60675	520.3	1.421	.79531	22.32035	.58148	501.0	1.367	.76662	21.51515	.62805
47	90	2.000	.250	533.3	1.472	.82727	23.08965	.53543	513.1	1.397	.78249	21.96034	.60247	493.8	1.347	.75562	21.20432	.64558
48	90	3.000	.375	520.3	1.421	.79524	22.31828	.58160	497.5	1.356	.76049	21.34119	.63783	484.2	1.319	.74099	20.74455	.66674
49	90	4.000	.500	479.5	1.304	.73294	20.56984	.68128	507.6	1.263	.71102	19.95460	.71537	457.8	1.244	.70060	19.66217	.73148
50	270	1.000	.125	550.3	1.506	.84112	23.60607	.50337	585.3	1.606	.89458	25.16038	.40212	621.2	1.711	.95057	26.67781	.27037
51	270	2.000	.250	540.7	1.479	.82640	23.19284	.52911	573.2	1.572	.87617	24.58979	.43870	603.2	1.660	.92294	25.90229	.34041
52	270	3.000	.375	523.8	1.431	.80663	22.46968	.57267	554.0	1.517	.84672	23.76324	.49338	580.3	1.594	.88794	24.91997	.41556
53	270	4.000	.500	482.9	1.314	.73805	20.71343	.67327	504.2	1.386	.77678	21.80019	.61712	528.5	1.446	.80873	22.69682	.55917
54	0	4.877	.610	14.1	.026	.02151	.40354	.315843	13.6	.028	.02079	.58326	.314161	13.7	.027	.02096	.58814	.317596
55	0	5.402	.741	R.1	.044	.01232	.34585	.354374	7.7	.044	.01184	.33232	3.57203	7.6	.045</td			

TABLE III.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_{\infty} = 4.63$  - Continued(c)  $\alpha = 10^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ$ , $p_t = 7924.2$ psf						$\phi = 90.0^\circ$ , $p_t = 7914.7$ psf					
			$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$		
1	0	.000	.000	597.4	1.641	.91307	25.62515	.36280	598.7	1.647	.91611	25.71051	.35602	
2	0	.200	.025	571.1	1.566	.87281	24.49538	.44516	589.1	1.619	.90142	25.29832	.38792	
3	0	.400	.050	530.4	1.449	.81060	22.74938	.55602	566.3	1.554	.86654	24.31936	.45704	
4	0	.600	.075	525.6	1.436	.80328	22.54397	.56927	557.9	1.530	.85369	23.95869	.48080	
5	0	.800	.100	522.0	1.425	.79779	22.38991	.57738	553.1	1.516	.84634	23.75259	.49406	
6	0	1.000	.125	520.8	1.422	.79596	22.33856	.58041	549.5	1.506	.84048	23.59802	.50387	
7	0	1.200	.150	516.0	1.408	.78864	22.13315	.59243	545.9	1.496	.83533	23.44345	.51358	
8	0	1.400	.175	516.0	1.408	.78864	22.13315	.59243	544.7	1.492	.83349	23.39193	.51679	
9	0	1.600	.200	516.0	1.408	.78864	22.13315	.59243	543.5	1.489	.83166	23.34040	.51999	
10	0	1.800	.225	513.6	1.401	.78498	22.03044	.59841	541.1	1.482	.82799	23.23735	.52637	
11	0	2.000	.250	513.6	1.401	.78498	22.03044	.59841	537.5	1.472	.82248	23.08278	.53585	
12	0	2.200	.275	510.0	1.391	.77949	21.87638	.60733	535.1	1.465	.81881	22.97973	.54212	
13	0	2.400	.300	507.6	1.384	.77583	21.77368	.61325	531.5	1.454	.81330	22.82516	.55147	
14	0	2.600	.325	505.2	1.378	.77217	21.67097	.61914	529.1	1.448	.80963	22.72211	.55765	
15	0	2.800	.350	501.6	1.367	.76668	21.51691	.62795	526.7	1.441	.80595	22.61907	.56381	
16	0	3.000	.375	498.0	1.357	.76119	21.36285	.63672	521.9	1.427	.79861	22.41297	.57602	
17	0	3.200	.400	494.5	1.347	.75570	21.20879	.64544	515.9	1.410	.78943	22.15535	.59114	
18	0	3.400	.425	489.7	1.333	.74839	21.00338	.65702	511.1	1.396	.78209	21.94925	.60312	
19	0	3.600	.450	483.7	1.316	.73924	20.74662	.67142	502.7	1.372	.76924	21.58858	.62386	
20	0	3.800	.475	476.5	1.295	.72826	20.43850	.68859	494.3	1.348	.75639	21.22792	.64436	
21	0	4.000	.500	466.9	1.268	.71362	20.02767	.71134	482.3	1.314	.73803	20.71267	.67332	
22	0	4.200	.525	449.0	1.217	.68617	19.25738	.75336	460.7	1.252	.70498	19.78524	.72471	
23	0	4.400	.550	416.6	1.124	.63677	17.87085	.82958	424.7	1.149	.64990	18.23952	.80939	
24	180	.200	.025	608.0	1.671	.92920	26.07782	.32560	589.9	1.621	.90259	25.33123	.38545	
25	180	.400	.050	598.3	1.644	.91448	25.66471	.35967	562.2	1.542	.86023	24.14221	.46880	
26	180	.600	.075	591.1	1.623	.90344	25.35488	.38366	553.7	1.518	.84733	23.78034	.49229	
27	180	.800	.100	585.1	1.606	.89424	25.09668	.40283	548.9	1.504	.83996	23.57355	.50542	
28	180	1.000	.125	583.9	1.602	.89240	25.04504	.40658	547.7	1.501	.83812	23.52186	.50867	
29	180	1.200	.150	579.1	1.589	.88504	24.83848	.42136	545.3	1.494	.83444	23.41846	.51514	
30	180	1.400	.175	575.5	1.578	.87952	24.69356	.43221	542.9	1.487	.83075	23.31507	.52156	
31	180	1.600	.200	573.1	1.571	.87584	24.59029	.43935	539.3	1.477	.82523	23.15998	.53112	
32	180	1.800	.225	571.9	1.568	.87400	24.52865	.44289	538.1	1.473	.82339	23.10829	.53429	
33	180	2.000	.250	565.8	1.551	.86480	24.27045	.46031	535.7	1.466	.81970	23.00489	.54059	
34	180	2.200	.275	563.4	1.544	.86112	24.16717	.46716	533.3	1.460	.81602	22.90150	.54686	
35	180	2.400	.300	559.8	1.534	.85560	24.01225	.47732	529.7	1.449	.81049	22.74661	.55620	
36	180	2.600	.325	555.0	1.520	.84824	23.80570	.49067	524.9	1.435	.80312	22.53982	.56853	
37	180	2.800	.350	551.4	1.509	.84272	23.65078	.50054	523.6	1.432	.80128	22.48793	.57159	
38	180	3.000	.375	547.8	1.499	.83720	23.49586	.51030	517.6	1.415	.79207	22.22945	.58681	
39	180	3.200	.400	541.8	1.482	.82800	23.23767	.52635	514.0	1.404	.78655	22.07436	.59586	
40	180	3.400	.425	533.3	1.458	.81512	22.87619	.54839	506.8	1.384	.77549	21.76418	.61379	
41	180	3.600	.450	526.1	1.437	.80408	22.56636	.56694	499.6	1.363	.76444	21.45400	.63154	
42	180	3.800	.475	515.3	1.406	.78752	22.10160	.59427	489.9	1.336	.74971	21.04043	.65494	
43	180	4.000	.500	502.0	1.368	.76728	21.53357	.62700	477.9	1.301	.73129	20.52347	.68386	
44	180	4.200	.525	475.5	1.293	.72690	20.39751	.69087	455.0	1.236	.69629	19.54123	.73812	
45	180	4.400	.550	439.4	1.189	.67160	18.84833	.77609	422.5	1.143	.64655	18.14543	.81454	
46	90	1.000	.125	496.8	1.354	.75936	21.31150	.63963	495.5	1.351	.75822	21.27944	.66145	
47	90	2.000	.250	489.7	1.333	.74839	21.00338	.65702	489.5	1.334	.74904	21.02182	.65599	
48	90	3.000	.375	481.3	1.309	.73558	20.64391	.67715	482.3	1.314	.73803	20.71267	.67332	
49	90	4.000	.500	459.7	1.247	.70264	19.71956	.72832	463.1	1.259	.70865	19.88829	.71903	
50	270	1.000	.125	644.1	1.774	.98440	27.62700	.15006	652.5	1.801	.99838	28.01944	.04814	
51	270	2.000	.250	627.2	1.726	.95864	26.90405	.24640	635.6	1.752	.97259	27.29569	.19965	
52	270	3.000	.375	602.0	1.654	.92000	25.81963	.34721	609.1	1.677	.93207	26.15837	.31862	
53	270	4.000	.500	549.0	1.503	.83904	23.56750	.50706	556.2	1.525	.85102	23.88373	.48565	
54	0	4.877	.610	13.4	-.028	.02044	.57377	3.19275	13.2	-.029	.02023	.56762	3.20008	
55	0	5.402	.675	8.0	-.044	.01217	.34153	3.55264	7.6	-.045	.01170	.32826	3.58077	
56	0	5.927	.741	7.5	-.045	.01144	.32104	3.59660	7.2	-.046	.01097	.30775	3.62678	
57	0	6.452	.807	7.3	-.046	.01120	.31421	3.61194	7.0	-.047	.01072	.30091	3.64287	
58	0	6.977	.872	7.5	-.045	.01144	.32104	3.59660	7.2	-.046	.01072	.30091	3.64287	
59	180	6.977	.872	7.3	-.046	.01120	.31421	3.61194	7.0	-.047	.01072	.30091	3.64287	
60	180	6.452	.807	7.5	-.045	.01144	.32104	3.59660	7.0	-.047	.01072	.30091	3.64287	
61	180	5.927	.741	7.2	-.046	.01095	.30738	3.62764	7.0	-.047	.01072	.30091	3.64287	
62	180	5.402	.675	7.2	-.046	.01095	.30738	3.62764	7.0	-.047	.01072	.30091	3.64287	
63	180	4.877	.610	7.5	-.045	.01144	.32104	3.59660	7.2	-.046	.01097	.30775	3.62678	

\*The following conversion factors can be used to convert these data to the International System of Units:

1 inch  $\square$  25.4 mm; 1 psf = 47.88 N/m<sup>2</sup>.

TABLE III.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 4.63$  - Continued(d)  $\alpha = 15^\circ$ 

Orifice	$\theta$ , deg	s, in.	s/d	$\phi = 0.0^\circ, p_t = 7923.4 \text{ psf}$					$\phi = 22.5^\circ, p_t = 7923.4 \text{ psf}$					$\phi = 45.0^\circ, p_t = 7914.7 \text{ psf}$				
				$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$
1	0	.000	.000	543.1	1.486	.83013	23.29751	.52245	540.7	1.479	.82656	23.19680	.52886	541.7	1.484	.82898	23.26518	.52465
2	0	.200	.025	478.4	1.301	.73117	20.50232	.68404	479.6	1.304	.73307	20.57366	.68107	490.2	1.336	.75011	21.05190	.65429
3	0	.400	.050	374.1	1.003	.57174	16.04596	.90598	388.5	1.044	.59379	16.66466	.90606	420.7	1.137	.64374	18.06655	.81886
4	0	.600	.075	390.8	1.051	.59740	16.76598	.89044	400.5	1.078	.61212	17.17900	.86760	421.9	1.141	.64558	18.11802	.81504
5	0	.800	.100	424.4	1.147	.64871	20.26060	.8123	416.1	1.123	.63596	17.84765	.82085	425.5	1.151	.65104	18.27243	.80759
6	0	1.000	.125	425.6	1.150	.65054	18.25743	.80841	419.6	1.133	.64144	18.00195	.82240	426.7	1.154	.65291	18.32391	.80478
7	0	1.200	.150	418.4	1.129	.63955	17.94885	.82531	418.5	1.130	.63961	17.95052	.82522	425.5	1.151	.65104	18.27243	.80759
8	0	1.400	.175	422.0	1.140	.64504	18.10314	.81686	419.6	1.133	.64144	18.00195	.82240	427.9	1.158	.65475	18.37538	.80196
9	0	1.600	.200	419.6	1.133	.64138	18.00028	.82249	419.6	1.133	.64144	18.00195	.82240	427.9	1.158	.65475	18.37538	.80196
10	0	1.800	.225	418.4	1.129	.63955	17.94885	.82531	419.6	1.133	.64144	18.00195	.82240	426.7	1.154	.65291	18.32391	.80478
11	0	2.000	.250	418.4	1.129	.63955	17.94885	.82531	418.5	1.130	.63961	17.95052	.82522	426.7	1.154	.65291	18.32391	.80478
12	0	2.200	.275	418.4	1.129	.63955	17.94885	.82531	418.5	1.130	.63961	17.95052	.82522	426.7	1.154	.65291	18.32391	.80478
13	0	2.400	.300	418.4	1.129	.63955	17.94885	.82531	417.3	1.126	.63777	17.89908	.82083	425.5	1.151	.65104	18.27243	.80759
14	0	2.600	.325	417.2	1.126	.63771	17.89742	.82813	416.1	1.123	.63594	17.84765	.83085	424.3	1.148	.64924	18.22096	.81041
15	0	2.800	.350	416.0	1.123	.63588	17.84599	.83094	416.1	1.123	.63594	17.84765	.83085	424.3	1.148	.64924	18.22096	.81041
16	0	3.000	.375	416.0	1.123	.63588	17.84599	.83094	414.9	1.119	.63411	17.79621	.83367	421.9	1.141	.64558	18.11802	.81604
17	0	3.200	.400	413.6	1.116	.63222	17.74313	.83659	412.5	1.112	.63044	17.69335	.83932	421.9	1.141	.64558	18.11802	.81604
18	0	3.400	.425	413.6	1.116	.63222	17.74313	.83659	412.5	1.112	.63044	17.69335	.83932	418.3	1.130	.64007	17.96360	.82450
19	0	3.600	.450	413.6	1.116	.63222	17.74313	.83659	410.1	1.106	.62678	17.59048	.84946	418.3	1.130	.64007	17.96360	.82450
20	0	3.800	.475	411.2	1.109	.62855	17.64027	.84223	407.7	1.099	.62311	17.48761	.85062	411.1	1.110	.62907	17.65477	.84143
21	0	4.000	.500	411.2	1.109	.62855	17.64027	.84223	405.3	1.092	.61945	17.38474	.85627	407.5	1.100	.62357	17.50036	.84992
22	0	4.200	.525	400.4	1.078	.61206	17.17741	.86769	399.1	1.071	.60845	17.07614	.87328	396.7	1.069	.60706	17.03712	.87543
23	0	4.400	.550	381.2	1.023	.58274	17.35454	.91332	377.7	1.013	.57730	16.20176	.92185	375.1	1.007	.57405	16.11063	.92696
24	0	4.600	.575	361.4	1.022	.57183	25.92923	.93746	599.1	1.046	.57723	25.99977	.93687	585.1	1.068	.89531	25.12677	.40093
25	0	4.800	.600	355.0	1.023	.57189	26.02223	.93746	599.1	1.046	.59583	26.48691	.94867	595.5	1.084	.89531	25.74719	.35308
26	0	5.000	.625	355.9	1.023	.57189	27.94764	.93747	609.8	1.060	.59761	27.99988	.94867	602.7	1.060	.92294	25.4229	.34611
27	0	5.200	.650	355.9	1.023	.57189	28.01218	.94542	600.0	641.2	.6766	28.0009	.94542	604.4	1.063	.92478	25.52559	.33610
28	0	5.400	.675	355.9	1.023	.57189	28.05096	.92667	612.1	1.076	.6766	28.0009	.94542	604.4	1.063	.92478	25.95399	.33610
29	0	5.600	.700	355.9	1.023	.57189	28.05118	.92667	612.0	1.076	.67661	27.56169	.94974	604.4	1.063	.92478	25.95399	.33610
30	0	5.800	.725	355.9	1.023	.57189	27.99930	.92784	638.8	1.780	.67661	27.40298	.94947	602.0	1.056	.65566	22.9119	.34667
31	0	6.000	.750	651.5	1.796	.99582	27.94764	.97737	638.8	1.780	.97641	27.40298	.94947	602.0	1.056	.91926	25.79889	.34690
32	0	6.200	.775	649.1	1.789	.99214	27.84432	.97314	638.4	1.753	.97274	27.29976	.99111	595.3	1.646	.91557	25.69548	.35722
33	0	6.400	.800	645.5	1.779	.98662	27.69324	.93887	632.8	1.742	.96722	27.14494	.91873	595.9	1.639	.91189	25.59208	.36540
34	0	6.600	.825	644.3	1.775	.98474	27.63768	.94874	632.0	1.739	.96538	27.09334	.92249	593.5	1.632	.90820	25.48868	.37345
35	0	6.800	.850	639.5	1.761	.97741	27.43105	.89095	626.8	1.725	.95803	26.88691	.94827	587.1	1.618	.90084	25.29187	.38915
36	0	7.000	.875	635.9	1.751	.97189	27.26707	.89223	622.0	1.711	.95067	26.69049	.94880	585.1	1.608	.89531	25.12677	.40063
37	0	7.200	.900	632.2	1.741	.96637	27.12109	.82161	619.9	1.704	.94969	26.55727	.92003	583.9	1.604	.89347	25.07507	.40440
38	0	7.400	.925	626.2	1.724	.95717	26.64628	.92087	613.5	1.687	.93780	26.31392	.93049	577.9	1.587	.88426	24.81656	.42291
39	0	7.600	.950	620.2	1.706	.94796	26.60450	.927736	608.7	1.674	.93044	26.11282	.932258	571.9	1.570	.87504	24.55806	.44087
40	0	7.800	.975	614.2	1.689	.93876	26.36426	.90183	601.5	1.653	.91941	25.80318	.94855	565.8	1.553	.86583	24.29985	.45836
41	0	8.000	.500	603.3	1.658	.92219	25.81817	.92125	593.1	1.629	.90654	25.44193	.93704	557.4	1.529	.85294	23.93764	.48217
42	0	8.200	.525	595.2	1.627	.90563	25.45634	.97899	581.1	1.594	.88815	24.92587	.94151	547.8	1.501	.83820	23.52403	.50853
43	0	8.400	.550	595.6	1.579	.87986	24.69311	.93155	564.4	1.550	.86425	24.25499	.94134	532.1	1.456	.81425	22.85192	.54985
44	0	8.600	.575	595.6	1.493	.83384	23.40163	.51619	536.5	1.457	.82011	23.01643	.95398	505.6	1.380	.77372	21.71449	.61665
45	0	8.800	.600	501.0	1.365	.76757	21.49024	.62947	492.4	1.343	.75392	21.15861	.64828	464.7	1.263	.71109	19.95665	.71526
46	0	9.000	.625	495.1	1.349	.75683	21.24033	.63436	486.2	1.319	.68726	19.28780	.75203	425.5	1.151	.65108	18.27243	.80759
47	0	9.200	.650	492.4	1.342	.75316	21.13747	.64947	484.8	1.215	.68542	19.23637	.75848	425.5	1.151	.65108	18.27243	.80759
48	0	9.400	.675	375.4	1.311	.73667	16.76761	.67544	424.4	1.198	.67626	18.07920	.76983	421.9	1.141	.64558	18.11802	.81604
49	0	9.600	.700	444.6	1.219	.76563	21.23194	.67512	415.6	1.133	.64144	18.00195	.82240	405.1	1.093	.61990	17.39742	.85598
50	0	270	1.000	449.4	1.348	.73667	21.23194	.6413	549.8	1.505	.64034	23.58400	.50475	605.6	1.666	.72663	26.00569	.33175
51	0	270	2.000	435.0	1.345	.75469	21.48028	.64765	547.4	1.499	.63666	23.40609	.51124	599.5	1.609	.73411	25.74719	.35308
52	0	270	3.000	375.0	1.317	.73996	20.76701	.67028	522.9	1.457	.62450	22.46142	.54527	504.3	1.594	.88794	24.91997	.41198
53	0	270	4.000	500.0	1.224	.69026	19.37221	.74740	493.2	1.343	.75392	21.15861	.64828	535.7	1.467	.81978	23.07062	.54046
54	0	4.877	.610	13.6	-.028	.58237	3.18264	13.3	-.029	.02028	.56906	3.19336	12.4	-.028	.02045	.57406	3.19241	
55	0	5.402	.675	8.2	-.043	.01255	.35213	3.53101	7.9	-.044	.01207	.33873	3.56848	7.8	-.044	.01193	.34887	.34664

TABLE III.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_{\infty} = 4.63$  - Continued(d)  $\alpha = 15^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ, p_t = 7914.7 \text{ psf}$						$\phi = 90.0^\circ, p_t = 7914.7 \text{ psf}$					
			$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$		
1	0	.000	.000	539.3	1.477	.82523	23.16010	.53112	538.7	1.475	.82431	23.13431	.53270	
2	0	.200	.025	506.9	1.384	.77572	21.77049	.61343	530.3	1.451	.81146	22.77364	.55456	
3	0	.400	.050	460.2	1.250	.70420	19.76328	.72591	507.5	1.386	.77658	21.79468	.61204	
4	0	.600	.075	454.2	1.233	.69503	19.50595	.74006	499.1	1.362	.76373	21.43401	.63267	
5	0	.800	.100	451.8	1.226	.69136	19.40301	.74571	496.7	1.355	.76006	21.33096	.63853	
6	0	1.000	.125	450.6	1.223	.68953	19.35155	.74853	494.3	1.348	.75639	21.22792	.64436	
7	0	1.200	.150	448.2	1.216	.68586	19.24861	.75417	490.7	1.338	.75088	21.07334	.65309	
8	0	1.400	.175	451.8	1.226	.69136	19.40301	.74571	494.3	1.348	.75639	21.22792	.64436	
9	0	1.600	.200	451.8	1.226	.69136	19.40301	.74571	494.3	1.348	.75639	21.22792	.64436	
10	0	1.800	.225	450.6	1.223	.68953	19.35155	.74853	493.1	1.345	.75455	21.17639	.64727	
11	0	2.000	.250	450.6	1.223	.68953	19.35155	.74853	490.7	1.338	.75088	21.07334	.65309	
12	0	2.200	.275	449.4	1.220	.68769	19.30008	.75135	490.7	1.338	.75088	21.07334	.65309	
13	0	2.400	.300	449.4	1.220	.68769	19.30008	.75135	489.5	1.334	.74904	21.02182	.65599	
14	0	2.600	.325	447.0	1.213	.68403	19.19715	.75699	487.1	1.327	.74537	20.91877	.66178	
15	0	2.800	.350	447.0	1.213	.68403	19.19715	.75699	485.9	1.324	.74353	20.86725	.66467	
16	0	3.000	.375	443.4	1.202	.67852	19.04275	.76545	482.3	1.314	.73803	20.71267	.67332	
17	0	3.200	.400	442.2	1.199	.67669	18.99128	.76827	477.5	1.300	.73068	20.50658	.68480	
18	0	3.400	.425	437.4	1.185	.66936	18.78541	.77953	473.9	1.290	.72518	20.35201	.69339	
19	0	3.600	.450	433.8	1.175	.66385	18.63101	.78798	467.9	1.272	.71600	20.09439	.70766	
20	0	3.800	.475	427.8	1.154	.65468	18.37368	.80205	460.7	1.252	.70498	19.78524	.72471	
21	0	4.000	.500	421.9	1.141	.64552	18.11634	.81614	451.1	1.224	.69029	19.37305	.74735	
22	0	4.200	.525	406.3	1.096	.62168	17.44727	.85283	431.9	1.169	.66092	18.54866	.79248	
23	0	4.400	.550	381.1	1.024	.58316	16.36647	.91265	400.7	1.080	.61319	17.20904	.86595	
24	180	.200	.025	559.8	1.535	.85654	24.03882	.47559	530.9	1.453	.81233	22.79811	.55309	
25	180	.400	.050	554.9	1.522	.84917	23.83203	.48898	503.2	1.373	.76997	21.66909	.62269	
26	180	.600	.075	550.1	1.508	.84181	23.62525	.50215	494.8	1.349	.75707	21.24722	.64327	
27	180	.800	.100	548.9	1.504	.83996	23.57355	.50542	491.1	1.339	.75155	21.09213	.65203	
28	180	1.000	.125	548.9	1.504	.83996	23.57355	.50542	492.4	1.342	.75339	21.14382	.64911	
29	180	1.200	.150	548.9	1.504	.83996	23.57355	.50542	491.1	1.339	.75155	21.09213	.65203	
30	180	1.400	.175	548.9	1.504	.83996	23.57355	.50542	492.4	1.342	.75339	21.14382	.64911	
31	180	1.600	.200	547.7	1.501	.83812	23.52186	.50867	489.9	1.336	.74971	21.04043	.65494	
32	180	1.800	.225	547.7	1.501	.83812	23.52186	.50867	489.9	1.336	.74971	21.04043	.65494	
33	180	2.000	.250	544.1	1.491	.83260	23.36677	.51836	488.7	1.332	.74786	20.98873	.65785	
34	180	2.200	.275	542.9	1.487	.83075	23.31507	.52156	488.7	1.332	.74786	20.98873	.65785	
35	180	2.400	.300	538.1	1.473	.82339	23.10829	.53429	485.1	1.322	.74234	20.83364	.66655	
36	180	2.600	.325	535.7	1.466	.81970	23.00489	.54059	482.7	1.315	.73865	20.73025	.67233	
37	180	2.800	.350	533.3	1.460	.81602	22.99150	.54686	482.7	1.315	.73865	20.73025	.67233	
38	180	3.000	.375	529.7	1.449	.81049	22.74641	.55620	479.1	1.305	.73313	20.57516	.68099	
39	180	3.200	.400	523.6	1.432	.80128	22.48793	.57159	476.7	1.298	.72944	20.47177	.68674	
40	180	3.400	.425	517.6	1.415	.79207	22.22945	.58681	470.7	1.280	.72023	20.21329	.70108	
41	180	3.600	.450	511.6	1.398	.78286	21.97096	.60186	465.9	1.267	.71286	20.00650	.71251	
42	180	3.800	.475	502.0	1.370	.78613	21.55739	.62564	458.6	1.246	.70181	19.69632	.72960	
43	180	4.000	.500	487.5	1.329	.74602	20.93704	.66075	449.0	1.218	.68708	19.28275	.75230	
44	180	4.200	.525	463.5	1.260	.70918	19.90311	.71821	428.5	1.180	.65576	18.40391	.80040	
45	180	4.400	.550	428.5	1.160	.65576	18.40391	.80040	398.5	1.074	.60971	17.11150	.87133	
46	90	1.000	.125	419.5	1.134	.64185	18.01341	.82177	428.3	1.159	.65541	18.39409	.80094	
47	90	2.000	.250	419.5	1.134	.64185	18.01341	.82177	418.7	1.132	.64072	17.98190	.82350	
48	90	3.000	.375	415.9	1.123	.63635	17.85901	.83023	415.1	1.121	.63522	17.82733	.83197	
49	90	4.000	.500	403.9	1.089	.61801	17.34344	.85850	406.7	1.097	.62237	17.46666	.85177	
50	270	1.000	.125	641.6	1.770	.98180	27.55417	.16219	653.7	1.804	.1.00022	28.07114	.00000	
51	270	2.000	.250	634.4	1.749	.97075	27.24400	.20638	646.4	1.783	.98917	27.76096	.12483	
52	270	3.000	.375	615.1	1.694	.94128	26.41685	.29531	626.0	1.725	.95785	26.88212	.24878	
53	270	4.000	.500	567.0	1.556	.86760	24.34900	.45505	576.6	1.584	.88233	24.76257	.42670	
54	0	4.877	.610	13.2	-.029	.02019	.56660	.320131	13.0	-.029	.01996	.54016	.32909	
55	0	5.402	.675	7.5	-.045	.01143	.32085	.3.9703	7.5	-.045	.01144	.32107	.3.59654	
56	0	5.927	.741	7.0	-.047	.01070	.30037	.3.64416	7.0	-.047	.01071	.30057	.3.64366	
57	0	6.452	.807	7.0	-.047	.01070	.30037	.3.64416	6.8	-.047	.01067	.29374	.3.66015	
58	0	6.977	.872	7.2	-.046	.01095	.30719	.3.62807	7.0	-.047	.01071	.30057	.3.64366	
59	180	6.977	.872	7.0	-.047	.01070	.30037	.3.64416	6.8	-.047	.01047	.29374	.3.66015	
60	180	6.452	.807	7.0	-.047	.01070	.30037	.3.64416	6.8	-.047	.01047	.29374	.3.66015	
61	180	5.927	.741	7.0	-.047	.01070	.30037	.3.64416	6.8	-.047	.01047	.29374	.3.66015	
62	180	5.402	.675	7.0	-.047	.01070	.30037	.3.64416	6.8	-.047	.01047	.29374	.3.66015	
63	180	4.877	.610	7.2	-.046	.01095	.30719	.3.62807	6.8	-.047	.01047	.29374	.3.66015	

\*The following conversion factors can be used to convert these data to the International System of Units:

1 inch = 25.4 mm; 1 psf = 47.88 N/m<sup>2</sup>.

TABLE III.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 4.63$  - Continued(e)  $\alpha = 20^\circ$ 

Orifice	$\theta$ , deg	s, in.	s/d	$\phi = 0.0^\circ$ , $p_t = 7923.4$ psf					$\phi = 22.5^\circ$ , $p_t = 7923.4$ psf					$\phi = 45.0^\circ$ , $p_t = 7924.2$ psf				
				$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$
1	0	.000	.000	484.4	1.318	74034	20,77747	.66969	480.4	1.308	73484	20,62318	.67831	477.0	1.297	72907	20,46118	.68733
2	0	.200	.025	418.4	1.129	63959	17,94845	.82531	416.0	1.123	63588	17,45949	.83094	421.9	1.139	64480	18,09632	.81723
3	0	.400	.050	296.1	.780	45263	12,73035	1.12734	314.1	.831	48012	13,47450	1.07983	344.8	.930	53306	14,96031	.99225
4	0	.600	.075	296.1	.780	45263	12,73035	1.12734	308.1	.814	47096	13,21735	1.09553	339.2	.903	51841	14,54903	1.01639
5	0	.800	.100	335.7	.893	51310	14,40022	1.02478	332.1	.883	50761	14,24594	1.03384	360.4	.906	52024	14,60044	1.01309
6	0	1.000	.125	356.1	.951	54426	15,27452	.97424	346.5	.907	52043	14,60594	1.01247	342.8	.913	52390	14,70326	1.00712
7	0	1.200	.150	345.3	.920	52776	14,81165	1.00084	341.7	.910	52227	14,85737	1.00970	341.6	.923	52227	14,85735	1.00910
8	0	1.400	.175	347.7	.927	53143	14,91452	.99490	344.1	.917	52593	14,76023	1.00382	346.4	.923	56040	14,85749	.99819
9	0	1.500	.200	346.5	.924	52960	14,83039	.99787	344.1	.917	52503	14,76023	1.00382	348.8	.927	53123	14,85780	.99822
10	0	1.800	.225	346.5	.924	52960	14,83039	.99787	345.3	.920	52776	14,81166	1.00884	350.0	.934	53306	14,96031	.99226
11	0	2.000	.250	347.5	.924	52960	14,83039	.99787	345.3	.920	52776	14,81166	1.00884	351.2	.937	53489	15,01172	.98930
12	0	2.200	.275	347.7	.927	53143	14,91452	.99490	345.3	.920	52776	14,81166	1.00884	351.2	.937	53672	15,06313	.98635
13	0	2.500	.300	347.7	.927	53143	14,91452	.99490	345.3	.920	52776	14,81166	1.00884	351.2	.937	53672	15,06313	.98635
14	0	2.600	.325	347.7	.927	53143	14,91452	.99490	345.3	.920	52776	14,81166	1.00884	351.2	.937	53672	15,06313	.98635
15	0	2.800	.350	347.7	.927	53143	14,91452	.99490	345.3	.920	52776	14,81166	1.00884	351.2	.937	53672	15,06313	.98635
16	0	3.000	.375	347.7	.927	53143	14,91452	.99490	345.3	.920	52776	14,81166	1.00884	351.2	.937	53672	15,06313	.98635
17	0	3.200	.400	346.5	.924	52960	14,83039	.99787	345.3	.920	52776	14,81166	1.00884	352.4	.941	53856	15,11454	.99340
18	0	3.400	.425	347.7	.927	53143	14,91452	.99490	345.3	.920	52776	14,81166	1.00884	350.0	.934	53489	15,01172	.98930
19	0	3.600	.450	347.7	.927	53143	14,91452	.99490	345.3	.920	52776	14,81166	1.00884	350.0	.934	53489	15,01172	.98930
20	0	3.800	.475	346.5	.924	52960	14,83039	.99787	344.1	.917	52593	14,76023	1.00382	347.6	.927	53123	14,90890	.99522
21	0	4.000	.500	347.7	.927	53143	14,91452	.99490	342.9	.914	52410	14,70880	1.00680	347.6	.927	53123	14,90890	.99522
22	0	4.200	.525	341.7	.910	52227	14,67377	1.00978	338.1	.900	51677	14,50308	1.01877	340.4	.906	52024	14,60044	1.01309
23	0	4.400	.550	332.1	.883	50761	14,24594	1.03384	326.1	.866	49844	13,9897	1.04905	352.2	.869	50009	14,03493	1.04631
24	180	.200	.025	562.4	1.541	45961	24,12486	.46995	556.9	1.526	85129	23,99153	.48515	535.7	1.465	81880	22,97947	.54214
25	180	.400	.050	606.9	1.688	92771	26,03625	.39191	596.4	1.636	91013	25,54278	.36925	559.8	1.534	85556	24,01225	.47732
26	180	.600	.075	638.3	1.758	97557	27,37393	.18829	621.9	1.711	95058	26,67801	.27005	574.3	1.575	87768	24,43193	.43579
27	180	.800	.100	647.9	1.785	99030	27,79266	.11809	629.1	1.732	96161	26,9762	.23713	579.1	1.589	88504	24,83848	.42136
28	180	1.000	.125	650.3	1.792	99398	27,95988	.09292	632.7	1.742	96713	27,14242	.21903	583.9	1.602	89240	25,04504	.40658
29	180	1.200	.150	652.7	1.799	99766	27,99930	.05784	633.9	1.746	96897	27,19043	.21269	585.1	1.606	89424	25,09668	.40283
30	180	1.400	.175	656.3	1.810	1.00318	28,15128	.00000	635.1	1.749	97081	27,24563	.20517	585.1	1.606	89608	25,14823	.39905
31	180	1.600	.200	655.1	1.806	1.00134	28,10262	.00000	634.3	1.752	97265	27,29723	.19945	586.3	1.609	89608	25,14823	.39905
32	180	1.800	.225	655.1	1.799	99766	27,99330	.05784	633.9	1.749	97881	27,24563	.20611	586.3	1.609	89608	25,14823	.39905
33	180	2.000	.250	652.7	1.792	99398	27,95988	.09292	632.7	1.747	98687	27,19463	.21269	585.1	1.606	89624	25,17686	.40283
34	180	2.200	.275	656.3	1.789	99474	27,94842	.10564	631.5	1.739	98529	27,14242	.21903	583.9	1.602	89240	25,04441	.40658
35	180	2.400	.300	661.7	1.789	99474	27,94842	.10564	631.5	1.739	98577	26,93622	.22591	585.1	1.595	88824	24,91176	.41402
36	180	2.600	.325	656.4	1.782	98478	27,64768	.14820	626.5	1.722	98610	26,43282	.25047	576.7	1.589	88504	24,83848	.42136
37	180	2.800	.350	654.4	1.775	98478	27,64768	.14820	626.5	1.722	98725	26,47180	.27005	574.3	1.575	87768	24,63193	.43579
38	180	3.000	.375	656.0	1.767	97925	27,42773	.17321	621.9	1.711	98058	26,47180	.29917	569.4	1.561	87032	24,42537	.44991
39	180	3.200	.400	657.0	1.757	97373	27,32773	.19338	617.1	1.697	98323	27,24563	.32727	564.6	1.547	86296	24,31981	.44374
40	180	3.400	.425	631.0	1.737	96463	27,16943	.22773	611.1	1.680	98403	26,21360	.31376	564.6	1.547	86296	24,31981	.44374
41	180	3.600	.450	622.6	1.713	95164	26,70782	.26704	603.9	1.660	98300	25,90399	.32027	557.4	1.527	85192	23,90998	.48402
42	180	3.800	.475	614.2	1.689	93876	26,34620	.30183	595.6	1.636	91013	25,54278	.36295	549.0	1.503	83904	23,54570	.50706
43	180	4.000	.500	598.5	1.644	91483	27,64763	.35889	579.8	1.591	88623	24,87196	.41699	535.7	1.465	81880	22,97947	.54214
44	180	4.200	.525	570.4	1.565	87249	24,48647	.44576	550.9	1.508	84210	23,6352	.50143	509.3	1.399	77832	21,84341	.60923
45	180	4.400	.550	525.1	1.434	80255	22,52342	.56949	507.6	1.385	77591	21,77586	.61312	468.1	1.272	71576	20,05767	.70803
46	90	1.000	.125	434.4	1.181	66703	18,72929	.78309	376.5	1.010	57541	16,14882	.92482	341.6	.910	52207	14,65185	1.01010
47	90	2.000	.250	434.8	1.188	67070	18,82135	.77747	378.8	1.016	57907	16,25168	.91966	350.0	.934	53489	15,01172	.98930
48	90	3.000	.375	432.8	1.171	66154	18,56600	.79153	378.8	1.016	57907	16,25168	.91966	351.2	.937	53672	15,06313	.98635
49	90	4.000	.500	407.6	1.099	62305	17,48599	.85071	363.3	.972	55525	15,58310	.95669	344.0	.917	52573	14,75467	1.00414
50	270	1.000	.125	438.3	1.186	67002	18,80396	.77852	512.4	1.398	78326	21,98227	.60120	581.5	1.595	88872	24,94176	.41402
51	270	2.000	.250	438.3	1.186	67002	18,80396	.77852	512.4	1.398	78326	21,98227	.60120	583.9	1.602	89240	25,04504	.40658
52	270	3.000	.375	433.5	1.173	66265	18,59732	.74982	504.0	1.374	77039	21,62106	.62200	574.3	1.575	87768	24,63193	.43579
53	270	4.000	.500	407.0	1.097	62216	17,46082	.85209	469.1	1.274	71707	20,12461	.70599	535.7	1.465	81880	22,97947	.54214
54	0	4.877	.610	13.3	-.029	.02029	.56947	3,19788	13.4	-.028	.02053	.57624	3,18983	13.2	-.029	.02019	.56655	3,20137
55	0	5.442	.675	7.6	-.045	.01159	.32541	.3,58698	7.7	-.045	.01184	.33219	.3,57232	7.6	-.045	.01167	.32764	3,58211
56	0	5.927	.741	7.0</td														

TABLE III.- TABULAR LISTING OF DATA\* FOR BLUNT CONE;  $M_\infty = 4.63$  - Concluded(e)  $\alpha = 20^\circ$  - Concluded

Orifice $\theta$ , deg s, in.	s/d	$\phi = 67.5^\circ$ , $p_t = 7914.7$ psf						$\phi = 90.0^\circ$ , $p_t = 7914.7$ psf					
		$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$		
1	0	.000	.000	477.0	1.298	.72987	20.48382	.68607	477.0	1.298	.72987	20.48382	.68607
2	0	.200	.025	441.0	1.196	.67486	18.93981	.77108	468.6	1.274	.71704	20.12355	.70604
3	0	.400	.050	394.3	1.062	.60334	16.93260	.88121	447.0	1.213	.68403	19.19715	.75699
4	0	.600	.075	383.5	1.031	.58683	16.46940	.90691	439.8	1.192	.67302	18.8835	.77390
5	0	.800	.100	379.9	1.021	.58133	16.31500	.91552	437.4	1.185	.66936	18.78541	.77953
6	0	1.000	.125	376.3	1.010	.57583	16.16060	.92416	435.0	1.178	.66569	18.68248	.78516
7	0	1.200	.150	372.7	1.000	.57033	16.00620	.93282	431.4	1.168	.66019	18.52808	.79361
8	0	1.400	.175	376.3	1.010	.57583	16.16060	.92416	436.2	1.182	.66752	18.73394	.78235
9	0	1.600	.200	377.5	1.014	.57766	16.21207	.92128	436.2	1.182	.66752	18.73394	.78235
10	0	1.800	.225	378.7	1.017	.57950	16.26353	.91840	436.2	1.182	.66752	18.73394	.78235
11	0	2.000	.250	379.9	1.021	.58133	16.31500	.91552	436.2	1.182	.66752	18.73394	.78235
12	0	2.200	.275	381.1	1.024	.58316	16.36647	.91265	437.4	1.185	.66936	18.78541	.77953
13	0	2.400	.300	381.1	1.024	.58316	16.36647	.91265	437.4	1.185	.66936	18.78541	.77953
14	0	2.600	.325	381.1	1.024	.58316	16.36647	.91265	436.2	1.182	.66752	18.73394	.78235
15	0	2.800	.350	379.9	1.021	.58133	16.31500	.91552	436.2	1.182	.66752	18.73394	.78235
16	0	3.000	.375	379.9	1.021	.58133	16.31500	.91552	436.2	1.172	.66202	18.57954	.79079
17	0	3.200	.400	379.9	1.021	.58133	16.31500	.91552	430.2	1.165	.65835	18.47661	.79642
18	0	3.400	.425	376.3	1.010	.57583	16.16060	.92416	426.6	1.154	.65285	18.32221	.80487
19	0	3.600	.450	373.9	1.003	.57216	16.05767	.92993	421.9	1.141	.64552	18.11634	.81614
20	0	3.800	.475	369.1	.990	.56683	15.85180	.94150	414.7	1.120	.63451	17.80754	.83305
21	0	4.000	.500	365.5	.979	.55932	15.69740	.95022	407.5	1.099	.62351	17.49874	.85000
22	0	4.200	.525	354.7	.949	.54282	15.23420	.97655	390.7	1.051	.59784	16.77820	.88976
23	0	4.400	.550	338.8	.897	.51531	14.46219	1.02116	365.5	.979	.55932	15.69740	.95022
24	180	.200	.025	505.6	1.380	.77365	21.71248	.61676	473.8	1.289	.72495	20.34569	.69374
25	180	.400	.050	509.2	1.391	.77918	21.86757	.60784	448.5	1.217	.68631	19.26128	.75348
26	180	.600	.075	509.2	1.391	.77918	21.86757	.60784	438.9	1.189	.67159	18.84817	.77610
27	180	.800	.100	509.2	1.391	.77918	21.86757	.60784	435.3	1.179	.66607	18.69325	.78457
28	180	1.000	.125	511.6	1.398	.78286	21.97096	.60186	435.3	1.179	.66607	18.69325	.78457
29	180	1.200	.150	512.8	1.401	.78470	22.02266	.59886	436.5	1.183	.66791	18.74489	.78175
30	180	1.400	.175	514.0	1.404	.78655	22.07436	.59586	437.7	1.186	.66975	18.79653	.77892
31	180	1.600	.200	512.8	1.401	.78470	22.02266	.59886	436.5	1.183	.66791	18.74489	.78175
32	180	1.800	.225	514.0	1.404	.78655	22.07436	.59586	437.7	1.186	.66975	18.79653	.77892
33	180	2.000	.250	512.8	1.401	.78470	22.02266	.59886	436.5	1.183	.66791	18.74489	.78175
34	180	2.200	.275	512.8	1.401	.78470	22.02266	.59886	437.7	1.186	.66975	18.79653	.77892
35	180	2.400	.300	509.2	1.391	.77918	21.86757	.60784	435.3	1.179	.66607	18.69325	.78457
36	180	2.600	.325	508.0	1.387	.77734	21.81588	.61082	434.1	1.176	.66423	18.64161	.78740
37	180	2.800	.350	506.8	1.384	.77549	21.76418	.61379	434.1	1.176	.66423	18.64161	.78740
38	180	3.000	.375	504.4	1.377	.77181	21.66079	.61973	432.9	1.172	.66239	18.58997	.79022
39	180	3.200	.400	500.8	1.367	.76628	21.50570	.62859	430.5	1.165	.65871	18.48670	.79587
40	180	3.400	.425	494.8	1.349	.75707	21.24722	.64327	425.7	1.152	.65135	18.28014	.80717
41	180	3.600	.450	488.7	1.332	.74786	20.98873	.65785	422.1	1.141	.64583	18.12523	.81565
42	180	3.800	.475	481.5	1.311	.73081	20.67855	.67522	416.0	1.124	.63663	17.86703	.82979
43	180	4.000	.500	469.5	1.277	.71839	20.16159	.70394	407.6	1.100	.62375	17.50556	.84963
44	180	4.200	.525	446.6	1.211	.68339	19.17936	.75797	392.0	1.055	.59983	16.83426	.88665
45	180	4.400	.550	412.9	1.115	.63182	17.73186	.83720	365.5	.979	.55935	15.69820	.95017
46	90	1.000	.125	340.4	.907	.52081	14.61659	1.01215	355.9	.952	.54465	15.24566	.97361
47	90	2.000	.250	346.4	.925	.52998	14.87393	.99724	346.4	.925	.52998	14.87393	.99724
48	90	3.000	.375	346.4	.925	.52998	14.87393	.99724	346.4	.925	.52998	14.87393	.99724
49	90	4.000	.500	340.4	.907	.52081	14.61659	1.01215	342.8	.914	.52448	14.71953	1.00618
50	270	1.000	.125	632.0	1.742	.99706	27.14060	.21925	650.5	1.795	.99543	27.93660	.08094
51	270	2.000	.250	633.2	1.745	.96891	27.19230	.21290	651.7	1.799	.99727	27.98824	.06254
52	270	3.000	.375	621.2	1.711	.95049	26.67534	.27032	638.5	1.761	.97703	27.42021	.18251
53	270	4.000	.500	581.4	1.597	.88970	24.96936	.41204	597.6	1.644	.91447	25.66449	.35969
54	0	4.877	.610	13.1	-.029	.02000	.56140	3.20758	13.1	-.029	.01997	.56055	3.20861
55	0	5.402	.675	7.5	-.045	.01147	.32178	3.59496	7.5	-.045	.01145	.32129	3.59604
56	0	5.927	.741	7.0	-.047	.01073	.30124	3.64207	7.0	-.047	.01072	.30078	3.64316
57	0	6.452	.807	6.9	-.047	.01049	.29439	3.65856	7.0	-.047	.01072	.30078	3.64316
58	0	6.977	.872	7.0	-.047	.01073	.30124	3.64207	7.0	-.047	.01072	.30078	3.64316
59	180	6.977	.872	7.0	-.047	.01073	.30124	3.64207	7.0	-.047	.01072	.30078	3.64316
60	180	6.452	.807	6.9	-.047	.01049	.29439	3.65856	7.0	-.047	.01072	.30078	3.64316
61	180	5.927	.741	6.9	-.047	.01049	.29439	3.65856	7.0	-.047	.01072	.30078	3.64316
62	180	5.402	.675	6.9	-.047	.01049	.29439	3.65856	7.0	-.047	.01072	.30078	3.64316
63	180	4.877	.610	6.9	-.047	.01049	.29439	3.65856	7.0	-.047	.01072	.30078	3.64316

\*The following conversion factors can be used to convert these data to the International System of Units:

1 inch = 25.4 mm; 1 psf = 47.88 N/m<sup>2</sup>.

TABLE IV.- TABULAR LISTING OF DATA\* FOR SHARP CONE;  $M_\infty = 2.96$ (a)  $\alpha = 0^\circ$ 

Orifice	$\theta, \text{deg}$	s, in.	s/d	$\phi = 0.0^\circ, p_t = 3254.8 \text{ psf}$					$\phi = 22.5^\circ, p_t = 3254.1 \text{ psf}$					$\phi = 45.0^\circ, p_t = 3255.8 \text{ psf}$				
				$p_l, \text{psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l, \text{psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l, \text{psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$
2	0	.253	.032	1080.2	1.709	.97669	11.47959	.19387	1040.2	1.709	.97690	11.48204	.19303	1081.4	1.710	.97748	11.48881	*18070
3	0	.463	.057	1065.8	1.684	.96367	11.32652	.23054	1065.8	1.684	.96389	11.32912	.23082	1064.7	1.687	.96554	11.34055	*22438
4	0	.663	.082	1058.6	1.671	.95716	11.24998	.25089	1058.6	1.672	.95739	11.25265	.25021	1061.0	1.675	.95903	11.27204	*24519
5	0	.863	.107	1045.4	1.648	.94522	11.19669	.29484	1045.4	1.649	.94546	11.1247	.28420	1047.8	1.652	.94710	11.13178	*27973
6	0	1.063	.132	1034.6	1.630	.93545	10.9989	.31022	1034.6	1.630	.93570	10.99778	.31060	1035.8	1.631	.93625	11.00427	*30821
7	0	1.253	.157	1023.8	1.611	.92569	10.88010	.33398	1022.7	1.609	.92484	10.87034	.33593	1025.0	1.612	.92649	10.88951	*33208
8	0	1.453	.182	1014.2	1.594	.91700	10.77806	.35401	1014.1	1.595	.91727	10.78114	.35342	1016.6	1.594	.91889	10.80025	*34973
9	0	1.653	.207	1004.6	1.578	.90832	10.67601	.37319	1007.1	1.582	.91076	10.71468	.36788	1007.0	1.581	.91021	10.69824	*36908
10	0	1.853	.232	996.2	1.563	.90073	10.58673	.39398	997.5	1.566	.90209	10.61273	.38652	998.8	1.569	.90370	10.62173	*38309
11	0	2.053	.257	987.8	1.549	.89313	10.47744	.40509	989.1	1.551	.89450	10.51352	.40229	990.2	1.552	.89502	10.51972	*40121
12	0	2.253	.282	979.4	1.534	.88553	10.48816	.42038	980.7	1.537	.88691	10.47432	.41764	983.0	1.540	.88852	10.44321	*41442
13	0	2.453	.307	969.8	1.517	.87685	10.30612	.43739	971.1	1.520	.87823	10.32237	.43471	973.4	1.523	.87984	10.34120	*43159
14	0	2.653	.332	960.2	1.501	.86817	10.20408	.45397	961.5	1.503	.86956	10.22042	.45134	963.8	1.506	.87116	10.23920	*44831
15	0	2.853	.357	949.4	1.482	.85840	10.09498	.47217	949.5	1.483	.85872	10.09298	.47159	951.8	1.486	.86031	10.11168	*46686
16	0	3.053	.382	937.4	1.461	.84755	9.96173	.49190	938.7	1.464	.84899	9.97829	.48950	941.0	1.467	.85054	9.99692	*48650
17	0	3.253	.407	923.0	1.436	.83453	9.80867	.51498	924.3	1.439	.83595	9.82936	.51249	926.6	1.442	.83753	9.84391	*50472
18	0	3.453	.432	909.8	1.413	.82259	9.66836	.53565	910.0	1.414	.82294	9.67244	.53506	934.4	1.415	.82357	9.67585	*53050
19	0	3.653	.457	898.2	1.386	.80848	9.50255	.55957	898.4	1.387	.80884	9.50797	.55977	898.8	1.392	.81149	9.51798	*55452
20	0	3.853	.482	872.6	1.349	.78895	9.27295	.59193	873.5	1.350	.78933	9.27739	.59131	876.0	1.353	.79068	9.29561	*58877
21	0	4.053	.507	851.0	1.311	.76542	9.04336	.62357	856.0	1.310	.76673	9.13526	.62468	853.4	1.315	.77135	9.06649	*62047
22	0	4.253	.532	805.3	1.232	.72818	8.58687	.68872	805.7	1.233	.72861	8.56374	.68804	807.7	1.236	.73012	8.58154	*68568
23	0	4.453	.557	739.3	1.166	.68466	7.87844	.76698	739.7	1.169	.68849	7.88244	.78011	741.7	1.172	.67045	7.88033	*77784
24	180	.253	.032	1061.4	1.711	.97778	11.49240	.17945	1080.2	1.709	.97690	11.49208	.18301	1081.4	1.710	.97748	11.48890	*1.0067
25	180	.453	.057	1049.2	1.689	.96582	11.51778	.22346	1067.0	1.686	.96494	11.51413	.22339	1067.0	1.685	.96442	11.53357	*22809
26	180	.653	.082	1056.1	1.667	.95494	11.2394	.25749	1054.9	1.665	.95466	11.21357	.26008	1054.9	1.664	.95354	11.20743	*26160
27	180	.853	.107	1044.1	1.646	.94406	11.09611	.28794	1042.9	1.644	.94318	11.08571	.29030	1044.1	1.644	.94374	11.09229	*28881
28	180	1.053	.132	1032.1	1.625	.93319	10.94927	.31586	1032.1	1.626	.93339	10.97063	.31536	1032.0	1.625	.93285	10.96435	*31668
29	180	1.253	.157	1023.7	1.611	.92557	10.87879	.33242	1023.7	1.611	.92577	10.88113	.33377	1023.6	1.610	.92523	10.87479	*33504
30	180	1.453	.182	1011.6	1.590	.91470	10.75095	.35918	1012.8	1.592	.91598	10.76605	.35631	1014.0	1.593	.91653	10.77244	*35508
31	180	1.653	.207	1003.2	1.575	.90708	10.6147	.37586	1004.4	1.578	.90837	10.67655	.37309	1004.3	1.577	.90782	10.67009	*37428
32	180	1.853	.232	998.4	1.561	.89947	10.51798	.39201	999.5	1.563	.90075	10.58704	.38932	995.9	1.562	.90020	10.58053	*39049
33	180	2.053	.257	984.0	1.542	.88968	10.44569	.41208	986.4	1.546	.89205	10.48475	.40729	986.3	1.545	.89149	10.47818	*40842
34	180	2.253	.282	978.0	1.522	.88424	10.39301	.42293	980.4	1.536	.88661	10.42082	.41823	980.3	1.535	.88605	10.41421	*41935
35	180	2.453	.307	965.9	1.511	.87337	10.26518	.44049	968.3	1.515	.87573	10.29296	.43955	968.2	1.514	.87516	10.28627	*44065
36	180	2.653	.332	956.3	1.494	.86647	10.16291	.46055	959.3	1.494	.86485	10.16510	.46020	957.4	1.495	.86537	10.17113	*45924
37	180	2.853	.357	949.3	1.473	.85379	10.03507	.48601	946.7	1.478	.85615	10.06281	.47631	946.5	1.477	.85557	10.05598	*47737
38	180	3.053	.382	933.4	1.454	.84400	9.92002	.49825	935.9	1.459	.84636	9.94773	.49404	936.9	1.460	.84686	9.95363	*49314
39	180	3.253	.407	922.6	1.436	.83821	9.8497	.51553	923.8	1.438	.83854	9.81987	.51331	924.9	1.439	.83594	9.82569	*51244
40	180	3.453	.432	904.6	1.404	.81790	9.61322	.54367	905.8	1.407	.81916	9.62807	.54151	908.0	1.410	.82074	9.64658	*53883
41	180	3.653	.457	888.9	1.377	.80376	9.44703	.56747	889.0	1.380	.80502	9.46195	.56537	892.3	1.383	.80659	9.48026	*56275
42	180	3.853	.482	869.7	1.344	.78636	9.24250	.59616	872.1	1.348	.78780	9.27006	.59233	873.1	1.349	.78917	9.27556	*59157
43	180	4.053	.507	854.6	1.302	.76460	9.03217	.61327	848.0	1.307	.76694	9.01433	.62753	847.8	1.306	.76631	9.00688	*62855
44	180	4.253	.532	795.1	1.215	.71892	8.44952	.70311	796.3	1.217	.72017	8.64552	.70118	799.6	1.222	.72277	8.49513	*69713
45	180	4.453	.557	742.2	1.123	.67107	7.89744	.77690	742.2	1.123	.67121	7.89914	.77688	744.2	1.124	.67270	7.90641	*77441
46	90	1.053	.132	1035.7	1.632	.93455	11.08627	.36741	1036.7	1.632	.93665	11.08099	.36720	1035.6	1.631	.93612	11.02727	*30854
47	90	2.053	.257	1035.7	1.590	.92833	9.03061	.62511	944.8	1.598	.92764	9.02511	.62462	884.6	1.307	.76701	9.01508	*52743
48	90	4.053	.457	887.8	1.399	.84842	8.49724	.44999	904.9	1.402	.84971	9.03913	.62471	1.043	.84937	9.04142	*49042	
49	270	1.055	.132	1035.7	1.590	.92833	9.03061	.62511	944.8	1.598	.92764	9.02511	.62462	884.6	1.307	.76701	9.01508	*52743
50	270	2.053	.257	887.8	1.399	.84842	8.49724	.44999	904.9	1.402	.84971	9.03913	.62471	1.043	.84937	9.04142	*49042	
51	270	3.053	.457	887.8	1.399	.84842	8.49724	.44999	904.9	1.402	.84971	9.03913	.62471	1.043	.84937	9.04142	*49042	
52	270	3.853	.482	887.8	1.399	.84842	8.49724	.44999	904.9	1.402	.84971	9.03913	.62471	1.043	.84937	9.04142	*49042	
53	270	4.053	.507	849.0	1.306	.76678	9.05239	.62780	844.0	1.307	.76694	9.01433	.62753	845.4	1.301	.76613	9.01330	*63203
54	0	4.931	.616	.36.5	-.100	.03299	.38779	.2.94614	.32.7	-.106	.03301	.38804	.2.87219	.36.5	-.100	.03300	.37883	*2.97253
55	0	5.456	.682	.33.1	-.106	.02995	.35207	.2.93646	.33.1	-.106	.02997	.35230	.2.93604	.33.1	-.106	.02996	.35211	*2.93639
56	0	5.991	.748	.33.0	-.106	.02981	.35037	.2.92967	.33.0	-.106	.02983	.35059	.2.93925	.33.0	-.106	.02981	.35041	*2.93960
57	0	6.506	.81															

TABLE IV.- TABULAR LISTING OF DATA\* FOR SHARP CONE;  $M_\infty = 2.96$  - Continued(a)  $\alpha = 0^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ$ , $p_t = 3256.1$ psf					$\phi = 90.0^\circ$ , $p_t = 3257.2$ psf					
			$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	
2	0	.253	.037	1080.2	1.708	.97630	11.47499	.18543	1081.4	1.709	.97705	11.48384	.18241
3	0	.453	.057	1065.8	1.683	.96330	11.32216	.23175	1067.0	1.684	.96405	11.33107	.22928
4	0	.653	.087	1058.6	1.671	.95679	11.24574	.25198	1059.8	1.672	.95756	11.25468	.24969
5	0	.853	.107	1046.6	1.650	.94596	11.18138	.28284	1046.6	1.649	.94564	11.18463	.28371
6	0	1.053	.137	1035.8	1.631	.93621	11.00376	.30832	1037.0	1.633	.93697	11.01278	.30638
7	0	1.253	.157	1025.0	1.612	.92645	10.88914	.33216	1025.0	1.612	.92614	10.88546	.33290
8	0	1.453	.182	1016.7	1.598	.91887	10.79999	.34978	1016.7	1.597	.91856	10.79634	.35048
9	0	1.653	.207	1008.3	1.583	.91128	10.71084	.36673	1008.3	1.583	.91098	10.70722	.36740
10	0	1.853	.232	998.7	1.567	.90262	10.60895	.38540	999.9	1.568	.90339	10.61810	.38375
11	0	2.053	.257	990.3	1.552	.89503	10.51980	.40120	990.3	1.552	.89473	10.51625	.40182
12	0	2.253	.282	983.1	1.540	.88853	10.44339	.41439	983.1	1.539	.88823	10.43986	.41499
13	0	2.453	.307	973.5	1.523	.87986	10.34150	.43154	974.7	1.525	.88065	10.35074	.43001
14	0	2.653	.332	963.9	1.507	.87119	10.23961	.44824	965.1	1.508	.87198	10.24889	.44674
15	0	2.853	.357	953.1	1.488	.86144	10.12499	.46656	953.1	1.487	.86115	10.12157	.44710
16	0	3.053	.382	941.1	1.467	.85060	9.99763	.48640	941.1	1.467	.85037	9.99425	.44691
17	0	3.253	.407	927.9	1.444	.83869	9.85754	.50768	929.1	1.446	.83949	9.86694	.50627
18	0	3.453	.432	913.6	1.419	.82568	9.70471	.53034	913.6	1.419	.82540	9.70143	.53082
19	0	3.653	.457	898.0	1.392	.81160	9.53914	.55434	898.0	1.392	.81132	9.53592	.55480
20	0	3.853	.482	876.4	1.355	.79209	9.3990	.58678	876.4	1.354	.79182	9.30675	.58721
21	0	4.053	.507	852.4	1.313	.77042	9.05518	.62196	853.6	1.315	.77124	9.06485	.62064
22	0	4.253	.532	808.1	1.237	.73033	8.54395	.68536	809.2	1.238	.73116	8.59379	.68405
23	0	4.453	.557	742.1	1.122	.67073	7.88438	.77742	742.1	1.122	.67051	7.88082	.77777
24	180	.253	.032	1079.0	1.706	.97522	11.46225	.18969	1079.0	1.705	.97489	11.45838	.19996
25	180	.453	.057	1065.8	1.683	.96326	11.32169	.23188	1065.8	1.682	.96294	11.31802	.23288
26	180	.653	.082	1053.7	1.662	.95238	11.19390	.26492	1055.0	1.664	.95317	11.20318	.26265
27	180	.853	.107	1042.9	1.643	.94260	11.07890	.29183	1043.0	1.643	.94232	11.07558	.29257
28	180	1.053	.132	1032.1	1.625	.93282	10.96389	.31678	1033.3	1.626	.93363	10.97351	.31476
29	180	1.253	.157	1023.7	1.610	.92520	10.87444	.33511	1023.7	1.610	.92495	10.87143	.33572
30	180	1.453	.182	1014.0	1.593	.91651	10.77222	.35513	1014.1	1.593	.91626	10.76935	.35568
31	180	1.653	.207	1004.4	1.577	.90781	10.64999	.37430	1004.5	1.576	.90758	10.66727	.37480
32	180	1.853	.232	996.0	1.562	.90020	10.58054	.39048	996.1	1.562	.89998	10.57795	.39095
33	180	2.053	.257	986.4	1.545	.89150	10.47831	.40440	986.5	1.545	.89129	10.47587	.40882
34	180	2.253	.282	980.4	1.535	.88607	10.41442	.41932	980.5	1.535	.88587	10.41207	.41192
35	180	2.453	.307	968.3	1.514	.87519	10.28664	.44059	968.5	1.514	.87501	10.28447	.44094
36	180	2.653	.332	957.5	1.495	.86541	10.17163	.45916	957.6	1.495	.86524	10.16963	.45948
37	180	2.853	.357	947.9	1.479	.85671	10.06940	.47528	949.2	1.481	.85764	10.06031	.47357
38	180	3.053	.382	938.3	1.462	.84801	9.96718	.49107	938.4	1.462	.84877	9.96547	.49133
39	180	3.253	.407	926.2	1.441	.83714	9.83939	.51040	927.6	1.443	.83810	9.85063	.50871
40	180	3.453	.432	909.4	1.412	.82197	9.66049	.53680	909.6	1.412	.82181	9.65924	.53698
41	180	3.653	.457	893.8	1.385	.80779	9.49437	.56074	894.0	1.385	.80770	9.49336	.56088
42	180	3.853	.482	874.5	1.352	.79039	9.29992	.58956	874.7	1.352	.79033	9.28920	.58966
43	180	4.053	.507	849.2	1.304	.76756	9.02157	.62654	850.7	1.310	.76862	9.03400	.62485
44	180	4.253	.532	799.9	1.222	.72299	8.49766	.69680	801.4	1.225	.72411	8.51085	.69505
45	180	4.453	.557	745.8	1.129	.67406	7.92263	.77230	748.6	1.133	.67634	7.94941	.76880
46	90	1.053	.132	1035.8	1.631	.93621	11.00376	.30432	1035.8	1.630	.93589	11.00005	.30912
47	90	2.053	.257	989.1	1.550	.89395	10.50706	.40342	989.1	1.550	.89365	10.50352	.40404
48	90	3.053	.382	937.5	1.461	.84735	9.95942	.49225	936.3	1.458	.84598	9.94333	.49471
49	90	4.053	.507	846.4	1.303	.76500	8.99150	.63064	846.4	1.303	.76474	8.98846	.63105
50	270	1.053	.132	1035.7	1.631	.93608	11.00223	.30865	1035.7	1.630	.93580	10.99902	.30934
51	270	2.053	.257	987.6	1.548	.89259	10.49109	.46619	987.7	1.547	.89238	10.48863	.46662
52	270	3.053	.382	934.7	1.456	.84475	9.92884	.49691	934.8	1.456	.84461	9.92719	.49716
53	270	4.053	.507	842.0	1.295	.76104	8.94490	.63697	843.5	1.297	.76210	8.95744	.63526
54	0	4.931	.616	36.9	-.099	.03339	.39246	2.86471	37.0	-.099	.03342	.39277	2.86420
55	0	5.456	.682	33.6	-.105	.03036	.35679	2.92765	33.6	-.105	.03038	.35706	2.92714
56	0	5.981	.748	33.4	-.105	.03021	.35509	2.93081	33.5	-.105	.03023	.35536	2.93030
57	0	6.506	.813	32.9	-.106	.02978	.34999	2.94039	33.0	-.106	.02980	.35026	2.93988
58	0	7.031	.879	32.5	-.107	.02934	.34489	2.95012	32.5	-.107	.02937	.34516	2.94961
59	180	7.031	.879	32.0	-.108	.02891	.33980	2.96001	32.0	-.108	.02893	.34006	2.95949
60	180	6.506	.813	32.8	-.106	.02963	.34829	2.94362	32.7	-.106	.02951	.34686	2.94635
61	180	5.981	.748	31.8	-.108	.02877	.33810	2.96334	31.7	-.108	.02864	.33666	2.96617
62	180	5.456	.682	31.7	-.108	.02862	.33640	2.96669	31.5	-.108	.02850	.33496	2.96954
63	180	4.931	.616	32.3	-.107	.02920	.34319	2.95340	32.2	-.107	.02908	.34176	2.95618

\*The following conversion factors can be used to convert these data to the International System of Units:

1 inch = 25.4 mm; 1 psf = 47.88 N/m<sup>2</sup>.

TABLE IV.- TABULAR LISTING OF DATA\* FOR SHARP CONE;  $M_\infty = 2.96$  - Continued(b)  $\alpha = 20^\circ$ 

Orifice	$\theta, \text{deg}$	s, in.	s/d	$\phi = 0.0^\circ, p_t = 3253.2 \text{ psf}$					$\phi = 22.5^\circ, p_t = 3254.2 \text{ psf}$					$\phi = 45.0^\circ, p_t = 3255.8 \text{ psf}$				
				$p_l, \text{psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l, \text{psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l, \text{psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$
2	0	.253	.032	743.3	1.126	.67241	7.90326	.77483	681.0	1.017	.61593	7.23818	.88186	666.9	.958	.58475	6.87288	.91017
3	0	.453	.057	715.7	1.078	.67474	7.61057	.81313	701.3	1.052	.63426	7.45481	.82344	676.9	1.010	.61187	7.19166	.86798
4	0	.653	.082	751.1	1.144	.68217	8.01798	.75984	707.3	1.063	.63964	7.51953	.82510	700.9	1.051	.63357	7.44669	.83450
5	0	.853	.107	727.7	1.099	.65832	7.17754	.70648	715.7	1.077	.64727	7.60773	.81344	706.9	1.062	.63899	7.51044	.82616
6	0	1.053	.132	716.9	1.080	.64856	7.62282	.81147	706.1	1.061	.63860	7.55679	.81677	703.3	1.055	.63574	7.47219	.83117
7	0	1.253	.157	699.0	1.049	.63220	7.42161	.82668	697.8	1.046	.63101	7.41658	.82845	697.3	1.045	.63031	7.40843	.83952
8	0	1.453	.182	702.5	1.055	.63554	7.44985	.83147	697.8	1.046	.63101	7.41658	.83845	699.7	1.049	.63248	7.43394	.83617
9	0	1.653	.207	697.8	1.047	.63120	7.41886	.83815	694.2	1.040	.62776	7.37835	.84346	697.3	1.045	.63031	7.40843	.83952
10	0	1.853	.232	694.2	1.040	.62795	7.34062	.84316	691.8	1.036	.62555	7.35287	.84680	696.1	1.043	.62923	7.39566	.84119
11	0	2.053	.257	691.8	1.036	.62578	7.35513	.84650	689.4	1.032	.62324	7.37738	.85014	693.7	1.039	.62706	7.37018	.84553
12	0	2.253	.282	691.8	1.036	.62578	7.35513	.84650	687.0	1.028	.62125	7.30189	.85349	692.5	1.037	.62597	7.35743	.84620
13	0	2.453	.307	689.4	1.032	.62361	7.32963	.84985	684.6	1.023	.61998	7.27641	.85684	691.3	1.034	.62489	7.34468	.84787
14	0	2.653	.332	685.8	1.026	.62036	7.29139	.85487	681.0	1.017	.61583	7.23818	.86186	688.9	1.030	.62272	7.31918	.85122
15	0	2.853	.357	684.6	1.024	.61927	7.27864	.85654	678.6	1.013	.61366	7.21269	.86522	685.3	1.024	.61947	7.24092	.85624
16	0	3.053	.382	681.0	1.017	.61602	7.24040	.86157	676.7	1.009	.61149	7.19721	.86857	681.7	1.018	.61621	7.24267	.86127
17	0	3.253	.407	676.2	1.009	.61168	7.18491	.86428	671.4	1.001	.60716	7.13623	.87529	678.1	1.012	.61296	7.20442	.86631
18	0	3.453	.432	673.8	1.005	.60951	7.16392	.87164	669.0	.996	.60499	7.11075	.87865	673.3	1.003	.60862	7.15341	.87302
19	0	3.653	.457	672.6	1.003	.60843	7.15117	.87332	665.4	.990	.60173	7.07252	.88370	668.5	.995	.60428	7.10241	.87975
20	0	3.853	.482	665.4	.990	.60192	7.07469	.88341	659.4	.986	.59631	7.00880	.89213	660.1	.980	.59668	7.01313	.8855
21	0	4.053	.507	665.4	.990	.60192	7.07469	.88341	655.8	.973	.59306	6.97057	.89719	655.3	.972	.59234	6.96214	.8881
22	0	4.253	.532	655.0	.995	.58344	6.85799	.91215	641.4	.949	.58005	6.81765	.91753	634.9	.937	.57700	6.74587	.92719
23	0	4.453	.557	616.2	.905	.55745	6.55205	.95319	611.6	.897	.55294	6.49971	.96036	602.5	.881	.54461	6.4109	.97368
24	180	.253	.032	1.052	1.020	.62628	1.04861	.994591	1.0451	1.054	.62151	1.08151	.98613	1.046	.61601	1.0813	.97826	
25	180	.453	.057	1.069	1.020	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
26	180	.653	.082	1.066	1.020	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
27	180	.853	.107	1.094	1.020	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
28	180	1.053	.132	1.098	1.020	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
29	180	1.253	.157	1.101	1.020	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
30	180	1.453	.182	1.101	1.020	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
31	180	1.653	.207	1.101	1.020	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
32	180	1.853	.232	1.101	1.020	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
33	180	2.053	.257	1.101	1.020	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
34	180	2.253	.282	1.095	1.017	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
35	180	2.453	.307	1.093	1.017	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
36	180	2.653	.332	1.088	1.017	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
37	180	2.853	.357	1.082	1.017	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
38	180	3.053	.382	1.076	1.017	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
39	180	3.253	.407	1.068	1.017	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
40	180	3.453	.432	1.057	1.017	.62620	1.04861	.994591	1.0442	1.054	.62151	1.08151	.98613	1.046	.61625	1.08290	.98355	
41	180	3.653	.457	1.042	1.045	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
42	180	3.853	.482	1.023	1.011	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
43	180	4.053	.507	.999	1.0570	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
44	180	4.253	.532	.950	1.0484	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
45	180	4.453	.557	.877	1.039	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
46	90	1.053	.132	1.022	1.020	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
47	90	2.053	.257	1.022	1.020	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
48	90	3.053	.382	1.022	1.020	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
49	90	4.053	.507	1.022	1.020	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
50	0	4.931	.616	.878	1.015	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
51	270	1.053	.132	1.022	1.020	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
52	270	2.053	.257	1.022	1.020	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
53	270	3.053	.382	1.022	1.020	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
54	0	4.931	.616	.878	1.015	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
55	0	5.456	.682	.878	1.015	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
56	0	5.981	.748	.878	1.015	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
57	0	6.506	.813	.878	1.015	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
58	0	7.031	.879	.878	1.015	.62620	1.04861	.98435	1.04970	1.016	.62970	1.04050	.97035	1.007	.61570	.90455	.94773	
59	180	7.031	.879	.878	1.015	.62620	1.04861	.98435	1.0497									

TABLE IV.- TABULAR LISTING OF DATA\* FOR SHARP CONE;  $M_\infty = 2.96$  - Concluded(b)  $\alpha = 20^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ, p_t = 3256.1 \text{ psf}$					$\phi = 90.0^\circ, p_t = 3256.0 \text{ psf}$					
			$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	
2	0	.253	.032	612.6	.898	.55371	6.50801	.95915	664.2	.988	.60037	7.05652	.88581
3	0	.453	.057	667.8	.994	.60355	7.09386	.80888	727.8	1.098	.65781	7.73161	.79725
4	0	.653	.082	718.1	1.081	.64906	7.62877	.81069	777.0	1.183	.70224	8.25384	.72894
5	0	.853	.107	722.9	1.089	.65339	7.67971	.80403	788.9	1.204	.71308	8.38121	.71218
6	0	1.053	.132	722.9	1.089	.65339	7.67971	.80403	790.1	1.206	.71416	8.39395	.71050
7	0	1.253	.157	720.5	1.085	.65123	7.65424	.80736	790.1	1.206	.71416	8.39395	.71050
8	0	1.453	.182	727.7	1.097	.65773	7.73065	.79738	799.7	1.222	.72283	8.49585	.69704
9	0	1.653	.207	727.7	1.097	.65773	7.73065	.79738	799.7	1.222	.72283	8.49585	.69704
10	0	1.853	.232	727.7	1.097	.65773	7.73065	.79738	800.9	1.224	.72392	8.50859	.69535
11	0	2.053	.257	726.5	1.095	.65665	7.71792	.79904	800.9	1.224	.72392	8.50859	.69535
12	0	2.253	.282	726.5	1.095	.65665	7.71792	.79904	800.9	1.224	.72392	8.50859	.69535
13	0	2.453	.307	725.3	1.093	.65556	7.70518	.80071	799.7	1.222	.72283	8.49585	.69704
14	0	2.653	.332	721.7	1.087	.65231	7.66697	.80570	797.3	1.218	.72066	8.47038	.70041
15	0	2.853	.357	719.3	1.083	.65014	7.64150	.80903	792.5	1.210	.71633	8.41943	.70714
16	0	3.053	.382	715.7	1.077	.64689	7.60329	.81402	787.7	1.201	.71200	8.36848	.71386
17	0	3.253	.407	709.7	1.066	.64148	7.53961	.82234	779.3	1.187	.70441	8.27931	.72559
18	0	3.453	.432	704.9	1.058	.63714	7.48867	.82901	772.2	1.174	.69791	8.20289	.73562
19	0	3.653	.457	695.4	1.041	.62847	7.36478	.84235	762.6	1.158	.68924	8.10099	.74898
20	0	3.853	.482	685.8	1.025	.61980	7.29490	.85572	748.2	1.133	.67623	7.94814	.76897
21	0	4.053	.507	676.2	1.004	.61114	7.19301	.86912	732.6	1.106	.66214	7.78256	.79060
22	0	4.253	.532	649.8	.962	.58730	6.90282	.90619	700.2	1.050	.63288	7.43865	.83556
23	0	4.453	.557	611.4	.936	.55262	6.49528	.96087	649.9	.983	.58737	6.90367	.90607
24	180	.253	.032	827.6	1.270	.74799	8.79156	.65765	707.4	1.082	.63935	7.51464	.82561
25	180	.453	.057	860.1	1.327	.77735	9.17658	.61080	747.1	1.131	.67523	7.93638	.77051
26	180	.653	.082	879.3	1.360	.79474	9.3103	.58242	773.5	1.177	.69915	8.21754	.73370
27	180	.853	.107	886.5	1.372	.80126	9.41770	.57162	782.0	1.191	.70677	8.3700	.72195
28	180	1.053	.132	896.2	1.389	.80996	9.51993	.55709	791.6	1.208	.71546	8.40924	.70848
29	180	1.253	.157	899.8	1.395	.81322	9.55827	.55159	796.4	1.216	.71981	8.46036	.70173
30	180	1.453	.182	902.2	1.400	.81540	9.53828	.54791	800.0	1.223	.72308	8.49870	.69666
31	180	1.653	.207	902.2	1.400	.81540	9.53828	.54791	801.2	1.225	.72416	8.51148	.69497
32	180	1.853	.232	902.2	1.400	.81540	9.53828	.54791	801.2	1.225	.72416	8.51148	.69497
33	180	2.053	.257	898.6	1.393	.81214	9.54549	.55343	800.0	1.223	.72308	8.49870	.69666
34	180	2.253	.282	897.4	1.391	.81105	9.53271	.55526	800.0	1.223	.72308	8.49870	.69666
35	180	2.453	.307	891.3	1.381	.80561	9.46882	.56438	794.0	1.212	.71764	8.43480	.70511
36	180	2.653	.332	887.7	1.375	.80235	9.43048	.56982	790.4	1.206	.71438	8.39646	.71017
37	180	2.853	.357	885.3	1.370	.80018	9.40492	.57343	789.2	1.204	.71329	8.38368	.71185
38	180	3.053	.382	880.5	1.362	.79583	9.35381	.58062	784.4	1.196	.70894	8.33256	.71859
39	180	3.253	.407	873.3	1.350	.78931	9.27714	.59135	778.3	1.185	.70350	8.26866	.72699
40	180	3.453	.432	862.5	1.331	.77952	9.16213	.60728	769.9	1.171	.69589	8.17920	.73873
41	180	3.653	.457	850.4	1.310	.76865	9.03435	.62480	761.5	1.156	.68828	8.08974	.75045
42	180	3.853	.482	836.0	1.245	.75560	8.88101	.64561	749.5	1.135	.67741	7.96194	.76717
43	180	4.053	.507	814.4	1.247	.73603	8.65100	.67644	731.4	1.104	.66110	7.77024	.79221
44	180	4.253	.532	772.3	1.175	.69798	8.20375	.73551	696.5	1.043	.62956	7.39962	.84067
45	180	4.453	.557	716.9	1.079	.64797	7.61594	.81236	649.6	.962	.58716	6.90120	.90640
46	90	1.053	.132	706.1	1.060	.63822	7.50141	.82734	714.6	1.075	.64589	7.59149	.81556
47	90	2.053	.257	690.6	1.033	.62414	7.33584	.84903	691.8	1.035	.62530	7.34948	.84724
48	90	3.053	.382	678.6	1.012	.61330	7.20848	.86577	679.8	1.015	.61446	7.22211	.86398
49	90	4.053	.507	654.6	.971	.59163	6.95377	.89942	658.3	.977	.59495	6.99284	.89424
50	270	1.053	.132	1074.2	1.698	.97087	11.41114	.20595	1100.8	1.744	.99491	11.69371	.08543
51	270	2.053	.257	1074.2	1.698	.97087	11.41114	.20595	1100.8	1.744	.99491	11.69371	.08543
52	270	3.053	.382	1048.9	1.654	.94804	11.14279	.27716	1077.9	1.704	.97425	11.45089	.19341
53	270	4.053	.507	973.1	1.523	.87954	10.33775	.43216	1002.1	1.573	.90575	10.64575	.37874
54	0	4.931	.616	25.4	-.119	.02294	.26984	3.11425	.251	-.120	.02270	.26675	3.12202
55	0	5.456	.682	21.1	-.127	.01906	.22402	3.24056	.210	-.127	.01894	.22257	3.24498
56	0	5.981	.748	20.8	-.127	.01877	.22062	3.25100	.20.6	-.127	.01865	.21917	3.25551
57	0	6.506	.813	20.8	-.127	.01877	.22062	3.25100	.20.6	-.127	.01865	.21917	3.25551
58	0	7.031	.879	20.8	-.127	.01877	.22062	3.25100	.20.6	-.127	.01865	.21917	3.25551
59	180	7.031	.879	20.8	-.127	.01877	.22062	3.25100	.20.6	-.127	.01865	.21917	3.25551
60	180	6.506	.813	20.8	-.127	.01877	.22062	3.25100	.20.6	-.127	.01865	.21917	3.25551
61	180	5.981	.748	20.8	-.127	.01877	.22062	3.25100	.20.6	-.127	.01865	.21917	3.25551
62	180	5.456	.682	20.9	-.127	.01892	.22232	3.24576	.20.6	-.127	.01865	.21917	3.25551
63	180	4.931	.616	21.1	-.127	.01906	.22402	3.24056	.20.8	-.127	.01879	.22087	3.25022

\*The following conversion factors can be used to convert these data to the International System of Units:

1 inch = 25.4 mm; 1 psf = 47.88 N/m<sup>2</sup>.

TABLE V.- TABULAR LISTING OF DATA\* FOR SHARP CONE;  $M_\infty = 3.95$ (a)  $\alpha = 0^\circ$ 

Orifice	$\theta$ , deg	s, in.	s/d	$\phi = 0.0^\circ$ , $p_t = 5808.2$ psf					$\phi = 22.5^\circ$ , $p_t = 5808.2$ psf					$\phi = 45.0^\circ$ , $p_t = 5808.2$ psf				
				$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$
2	0	.253	.032	609.0	1.720	.96196	19.7102	.23604	809.9	1.719	.96187	19.7719	.23633	809.3	1.720	.96231	19.7883	.23491
3	0	.453	.057	794.2	1.695	.94911	19.51688	.27418	796.9	1.693	.94760	19.48573	.27837	797.3	1.693	.94806	19.49520	.27710
4	0	.653	.082	792.2	1.682	.94194	19.37014	.29348	790.9	1.679	.94046	19.33900	.29743	791.3	1.680	.94093	19.34862	.29622
5	0	.853	.107	782.6	1.660	.93056	19.13535	.32320	781.3	1.658	.92904	19.10423	.32597	780.5	1.656	.92810	19.08477	.32824
6	0	1.053	.132	774.2	1.642	.92057	18.92991	.34590	772.9	1.639	.91905	18.89881	.34936	773.4	1.640	.91954	18.90888	.34824
7	0	1.253	.157	767.0	1.626	.91200	18.75382	.36515	765.7	1.623	.91049	18.72273	.36847	766.2	1.624	.91099	18.73298	.36738
8	0	1.453	.182	761.0	1.612	.90487	18.66707	.38062	759.7	1.609	.90336	18.57600	.39383	760.2	1.610	.90386	18.58640	.38276
9	0	1.653	.207	755.0	1.599	.89773	18.44033	.39563	754.9	1.599	.89765	18.45862	.39980	755.4	1.599	.89816	18.46913	.39474
10	0	1.853	.232	750.2	1.588	.89202	18.34293	.40734	749.9	1.585	.89051	18.31189	.41040	749.2	1.583	.88961	18.29324	.41223
11	0	2.053	.257	745.4	1.577	.88631	18.22554	.41882	744.1	1.576	.88480	18.19450	.42182	743.4	1.573	.88390	18.17597	.42361
12	0	2.253	.282	740.6	1.566	.88060	18.11814	.43009	739.1	1.561	.87867	18.04777	.43581	737.4	1.559	.87677	18.02939	.43754
13	0	2.453	.307	734.6	1.553	.87371	17.96140	.44390	732.1	1.547	.87053	17.90105	.44950	731.4	1.546	.86965	17.88281	.45118
14	0	2.653	.332	728.6	1.540	.86633	17.81566	.45343	726.3	1.537	.86642	17.78366	.46025	725.4	1.532	.86252	17.73523	.46456
15	0	2.853	.357	722.6	1.526	.85920	17.66791	.47071	720.3	1.521	.85626	17.60759	.47676	719.4	1.519	.85539	17.58965	.47770
16	0	3.053	.382	714.4	1.510	.85063	17.49182	.48625	712.0	1.504	.84770	17.44151	.50243	712.8	1.503	.84368	17.41375	.49168
17	0	3.253	.407	705.8	1.489	.83921	17.25703	.50674	704.9	1.486	.83771	17.23009	.50940	703.8	1.484	.83686	17.18854	.51090
18	0	3.453	.432	696.2	1.467	.82780	17.02224	.52669	694.0	1.466	.82629	16.99132	.53029	692.9	1.463	.82545	16.97251	.53074
19	0	3.653	.457	684.4	1.443	.81495	17.58511	.54867	684.1	1.440	.81345	16.72721	.55121	683.4	1.438	.81262	16.71017	.55261
20	0	3.853	.482	671.0	1.411	.79782	16.40592	.57733	669.7	1.408	.79622	16.37055	.57981	667.8	1.406	.79409	16.33906	.56349
21	0	4.053	.507	653.0	1.370	.77642	15.96569	.61230	651.7	1.367	.77492	15.93486	.61472	651.1	1.366	.77413	15.91863	.61599
22	0	4.253	.532	621.8	1.300	.73931	15.20242	.67131	619.3	1.295	.73639	15.14252	.67589	618.7	1.293	.73564	15.12710	.67066
23	0	4.453	.557	569.0	1.182	.67651	13.91128	.76854	567.7	1.179	.67502	13.88065	.77083	567.1	1.178	.67433	13.86651	.77189
24	180	.253	.032	811.7	1.726	.96518	19.84725	.22559	815.0	1.733	.96903	19.92656	.21249	814.1	1.731	.96804	19.90615	.21591
25	180	.453	.057	798.5	1.696	.94943	19.52334	.23730	799.3	1.698	.95040	19.54334	.27057	800.9	1.701	.95229	19.58223	.26519
26	180	.653	.082	790.1	1.677	.93940	19.31721	.30018	790.9	1.670	.94036	19.33700	.29769	790.1	1.677	.93940	19.31721	.30018
27	180	.853	.107	779.2	1.653	.92651	19.05218	.33202	781.2	1.657	.92890	19.10118	.32632	782.8	1.661	.93081	19.14052	.32169
28	180	1.053	.132	770.8	1.634	.91649	18.84606	.35517	772.8	1.638	.91886	18.89484	.34980	772.0	1.637	.91792	18.87550	.35193
29	180	1.253	.157	766.0	1.623	.91076	18.72827	.36788	766.8	1.625	.91169	18.74746	.36583	767.2	1.626	.91219	18.75771	.36473
30	180	1.453	.182	756.3	1.602	.89931	18.42629	.39235	755.9	1.609	.90309	18.57059	.38439	755.7	1.607	.90217	18.55159	.36364
31	180	1.653	.207	750.3	1.588	.89214	18.34546	.40709	753.5	1.595	.89593	18.42321	.39936	752.7	1.594	.89501	18.40435	.40124
32	180	1.853	.232	744.3	1.575	.88494	18.19822	.42146	746.1	1.579	.88773	18.74634	.41681	746.7	1.580	.88785	18.25712	.41576
33	180	2.053	.257	737.1	1.558	.87639	18.02154	.43492	741.4	1.568	.88159	18.17844	.42816	740.7	1.567	.88069	18.19988	.42993
34	180	2.253	.282	732.2	1.548	.87066	17.90375	.44925	735.4	1.555	.87442	17.98105	.44207	734.7	1.553	.87353	17.96265	.44378
35	180	2.453	.307	725.0	1.530	.86207	17.77070	.46538	727.0	1.536	.86439	17.77411	.44107	726.2	1.534	.86350	17.76562	.44272
36	180	2.653	.332	717.8	1.515	.85548	17.55039	.48118	719.7	1.520	.85579	17.59785	.47697	719.0	1.518	.85491	17.57984	.47857
37	180	2.853	.357	711.8	1.502	.84942	17.34155	.49411	713.5	1.504	.84719	17.40298	.49255	711.8	1.502	.84632	17.40315	.49411
38	180	3.053	.382	703.3	1.483	.83630	17.14763	.51188	705.8	1.487	.83859	17.24422	.50785	704.5	1.486	.83773	17.22647	.50936
39	180	3.253	.407	696.1	1.467	.82770	17.02034	.52645	698.6	1.466	.82727	17.08030	.52786	696.1	1.467	.82770	17.02034	.52685
40	180	3.453	.432	684.1	1.440	.81338	16.75887	.55132	684.8	1.441	.81422	16.74301	.54991	684.1	1.440	.81338	16.72587	.55132
41	180	3.653	.457	673.2	1.416	.80050	16.44095	.58190	673.9	1.417	.80132	16.42399	.58082	674.4	1.418	.80193	16.49030	.57052
42	180	3.853	.482	658.8	1.393	.78331	16.17479	.60113	659.5	1.385	.78411	16.13299	.59982	659.8	1.383	.78331	16.17479	.60113
43	180	4.053	.507	640.7	1.343	.76183	15.66578	.63570	641.4	1.344	.76241	15.68183	.64346	641.8	1.346	.76326	15.69532	.63342
44	180	4.253	.532	605.8	1.265	.72030	14.91182	.70097	604.4	1.266	.72104	14.87200	.69982	605.8	1.265	.72030	14.87200	.67097
45	180	4.453	.557	556.3	1.170	.67018	13.78118	.77826	565.6	1.174	.67230	13.84677	.77501	566.8	1.173	.67161	13.81062	.77606
46	90	1.053	.132	777.8	1.650	.92485	19.01795	.33595	776.5	1.647	.92334	18.98685	.33949	777.0	1.648	.92282	19.06823	.34266
47	90	2.053	.257	745.4	1.577	.88631	18.22554	.41882	745.3	1.577	.88623	18.22345	.41899	748.2	1.583	.88691	18.23234	.41223
48	90	3.053	.382	710.6	1.499	.84492	17.37443	.46660	712.9	1.504	.84770	17.41511	.49163	715.8	1.511	.85111	17.50170	.48546
49	90	4.053	.507	654.8	1.354	.75785	15.74960	.62608	648.1	1.359	.77064	15.68683	.62161	652.3	1.369	.77555	15.69795	.61370
50	270	1.053	.132	772.0	1.637	.91792	18.47550	.35193	772.8	1.638	.91886	18.49484	.34980	772.0	1.637	.91792	18.47550	.35193
51	270	2.053	.257	741.9	1.569	.88212	18.13933	.42712	742.6	1.571	.88302	18.15791	.42534	738.3	1.561	.87782	18.05099	.42550
52	270	3.053	.382	707.0	1.491	.84059	17.28537	.50431	705.3	1.487	.83859	17.24412	.50785	702.1	1.480	.83486	17.16758	.51439
53	270	4.053	.507	641.9	1.346	.76326	15.69523	.63342	641.4	1.344	.76261	15.68183	.63446	639.5	1.340	.76040	15.63634	.63798
54	0	4.931	.616	18.6	-.050	.02217	4.65594	3.13775	18.8	-.050	.02234	4.4933	3.13274	18.6	-.050	.02217	4.65594	3.13775
55	0	5.456	.682	13.7	-.061	.01630	.31514	3.34817	13.9	-.061	.01647	.33866	3.34094	13.7	-.061	.01630	.33514	3.34817
56	0	5.981	.744	13.2	-.062	.01573	.37345	3.37276	13.5	-.061	.01609							

TABLE V.- TABULAR LISTING OF DATA\* FOR SHARP CONE;  $M_\infty = 3.95$  - Continued(a)  $\alpha = 0^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ, p_t = 5808.2 \text{ psf}$						$\phi = 90.0^\circ, p_t = 5808.2 \text{ psf}$					
			$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$		
2	0	.253	.032	810.2	1.722	.96338	19.81037	.23146	810.2	1.722	.96338	19.81037	.23146	
3	0	.453	.057	797.0	1.693	.94768	19.49753	.27813	798.2	1.695	.94911	19.51688	.27418	
4	0	.653	.082	792.2	1.682	.94198	19.37014	.29348	792.2	1.682	.94198	19.37014	.29348	
5	0	.853	.107	781.4	1.658	.92913	19.10600	.32576	781.4	1.658	.92913	19.10600	.32576	
6	0	1.053	.132	773.0	1.639	.91914	18.90056	.34916	774.2	1.642	.92057	18.92991	.34590	
7	0	1.253	.157	765.8	1.623	.9058	18.72447	.36865	765.8	1.623	.91058	18.72447	.36828	
8	0	1.453	.182	759.8	1.609	.90344	18.57772	.38365	759.8	1.609	.90344	18.57772	.38365	
9	0	1.653	.207	755.0	1.599	.89773	18.46033	.39563	753.8	1.596	.89630	18.43098	.39858	
10	0	1.853	.232	749.0	1.585	.89060	18.31359	.41023	747.8	1.583	.88917	18.28426	.41311	
11	0	2.053	.257	743.0	1.572	.88346	18.16684	.42448	741.8	1.569	.88203	18.13749	.42729	
12	0	2.253	.282	738.2	1.561	.87775	18.04945	.43565	737.0	1.558	.87632	18.02010	.43841	
13	0	2.453	.307	731.0	1.545	.86919	17.97336	.45205	729.8	1.542	.86776	17.84401	.45474	
14	0	2.653	.332	725.0	1.531	.86205	17.72661	.46543	723.8	1.529	.86062	17.69726	.46807	
15	0	2.853	.357	719.0	1.518	.85549	17.57987	.47857	717.8	1.515	.85349	17.55052	.48117	
16	0	3.053	.382	710.6	1.499	.84492	17.37443	.49660	709.4	1.497	.84350	17.34508	.49915	
17	0	3.253	.407	701.0	1.478	.83351	17.13964	.51677	701.0	1.478	.83351	17.13964	.51677	
18	0	3.453	.432	692.6	1.459	.82351	16.93420	.53407	691.4	1.456	.82209	16.90485	.53652	
19	0	3.653	.457	680.6	1.432	.80924	16.64071	.55830	679.4	1.429	.80782	16.61136	.56069	
20	0	3.853	.482	666.2	1.400	.79212	16.29853	.58674	663.8	1.394	.78926	16.22983	.59142	
21	0	4.053	.507	649.4	1.362	.77213	15.87766	.61920	647.0	1.357	.76928	15.81895	.62379	
22	0	4.253	.532	615.8	1.287	.73217	15.05588	.68248	614.6	1.284	.73074	15.02653	.68471	
23	0	4.453	.557	565.4	1.174	.67223	13.82324	.77512	564.2	1.171	.67080	13.79389	.77731	
24	180	.253	.032	810.8	1.724	.96410	19.82513	.22913	811.4	1.725	.96482	19.83995	.22676	
25	180	.453	.057	798.8	1.697	.94980	19.53098	.27226	799.4	1.698	.95049	19.54515	.27032	
26	180	.653	.082	790.4	1.678	.93978	19.32509	.29919	790.9	1.679	.94045	19.33879	.29746	
27	180	.853	.107	780.8	1.656	.92834	19.08977	.32766	783.7	1.663	.93185	19.16191	.31915	
28	180	1.053	.132	772.3	1.637	.91833	18.88387	.35101	774.1	1.641	.92038	18.92607	.34633	
29	180	1.253	.157	766.3	1.624	.91118	18.73680	.36697	768.0	1.628	.91321	18.77867	.36268	
30	180	1.453	.182	759.1	1.608	.90259	18.56032	.39454	760.8	1.612	.90461	18.60179	.38116	
31	180	1.653	.207	753.1	1.594	.89544	18.41325	.40403	754.8	1.598	.89744	18.45439	.39623	
32	180	1.853	.232	747.1	1.581	.88829	18.26618	.41488	748.7	1.585	.89027	18.30699	.41088	
33	180	2.053	.257	741.1	1.567	.88114	18.11911	.42905	741.5	1.568	.88167	18.13012	.42800	
34	180	2.253	.282	735.0	1.554	.87399	17.97204	.44291	736.7	1.558	.87594	18.01220	.43915	
35	180	2.453	.307	729.0	1.541	.86683	17.82496	.45649	729.4	1.541	.86734	17.83532	.45554	
36	180	2.653	.332	719.4	1.519	.85539	17.58965	.47770	723.4	1.528	.86017	17.68792	.46891	
37	180	2.853	.357	713.6	1.505	.84824	17.44258	.49066	717.4	1.514	.85300	17.54052	.48205	
38	180	3.053	.382	706.2	1.489	.83966	17.26610	.50597	707.7	1.493	.84153	17.30468	.50264	
39	180	3.253	.407	697.7	1.470	.82964	17.06020	.52350	699.3	1.474	.83150	17.09832	.52027	
40	180	3.453	.432	685.7	1.444	.81534	16.76606	.54801	688.5	1.450	.81859	16.83300	.54248	
41	180	3.653	.457	676.1	1.422	.80389	16.53074	.56725	676.4	1.423	.80426	16.53820	.56664	
42	180	3.853	.482	662.9	1.392	.78816	16.20719	.59322	663.1	1.393	.78849	16.21392	.59268	
43	180	4.053	.507	646.0	1.355	.76813	15.79539	.62563	645.0	1.353	.76698	15.77173	.62747	
44	180	4.253	.532	608.7	1.271	.72379	14.88355	.69555	610.1	1.274	.72541	14.91681	.69303	
45	180	4.453	.557	566.6	1.177	.67373	13.85406	.77282	567.9	1.180	.67523	13.88502	.77051	
46	90	1.053	.132	776.6	1.647	.92342	18.98861	.33929	775.4	1.644	.92199	18.95926	.34261	
47	90	2.053	.257	747.8	1.583	.88917	18.29424	.41311	745.4	1.577	.88631	18.22554	.41882	
48	90	3.053	.382	716.6	1.513	.85206	17.52117	.48376	714.2	1.507	.84921	17.46247	.48892	
49	90	4.053	.507	653.0	1.370	.77642	15.96569	.61230	651.8	1.368	.77499	15.93634	.61461	
50	270	1.053	.132	772.3	1.637	.91833	18.88387	.35101	775.3	1.644	.92181	18.95555	.34302	
51	270	2.053	.257	738.6	1.562	.87828	18.06028	.43463	741.5	1.568	.88167	18.13012	.42800	
52	270	3.053	.382	702.6	1.481	.83536	17.17785	.51352	705.3	1.487	.83866	17.24572	.50771	
53	270	4.053	.507	638.8	1.339	.75955	15.61890	.63933	640.2	1.342	.76125	15.65381	.63663	
54	0	4.931	.616	18.7	-.050	.02220	.45645	3.13700	18.8	-.049	.02236	.45984	3.13199	
55	0	5.456	.682	13.9	-.060	.01651	.33941	3.33942	14.0	-.060	.01668	.34293	3.33228	
56	0	5.981	.748	13.6	-.061	.01613	.33161	3.35550	13.7	-.061	.01630	.33514	3.34817	
57	0	6.506	.813	13.4	-.062	.01594	.32771	3.36370	13.4	-.062	.01592	.32734	3.36446	
58	0	7.031	.879	13.1	-.062	.01556	.31990	3.38041	13.1	-.062	.01554	.31955	3.38118	
59	180	7.031	.879	13.1	-.062	.01556	.31990	3.38041	13.1	-.062	.01554	.31955	3.38118	
60	180	6.506	.813	13.2	-.062	.01575	.32380	3.37200	13.4	-.062	.01592	.32734	3.36446	
61	180	5.981	.748	12.8	-.063	.01518	.31210	3.39757	12.8	-.063	.01516	.31176	3.39834	
62	180	5.456	.682	12.6	-.063	.01499	.30820	3.40632	12.6	-.063	.01497	.30786	3.40709	
63	180	4.931	.616	12.8	-.063	.01518	.31210	3.39757	12.9	-.063	.01535	.31565	3.38970	

\*The following conversion factors can be used to convert these data to the International System of Units:

1 inch  $\square$  25.4 mm; 1 psf  $= 47.88 \text{ N/m}^2$ .

TABLE V.- TABULAR LISTING OF DATA\* FOR SHARP CONE;  $M_\infty = 3.95$  - Continued(b)  $\alpha = 20^\circ$ 

Orifice	$\theta$ , deg	s, in.	s/d	$\phi = 0.0^\circ, p_t = 5808.2 \text{ psf}$					$\phi = 22.5^\circ, p_t = 5808.2 \text{ psf}$					$\phi = 45.0^\circ, p_t = 5808.2 \text{ psf}$					
				$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	
2	0	.253	.032	513.7	1.059	.61086	12.56124	.84955	464.5	.948	.55229	11.15689	.96140	435.7	.884	.51804	10.65259	1.01669	
3	0	.453	.057	494.1	1.024	.59233	12.17971	.8937	483.7	.991	.57512	11.42643	.92527	463.3	.946	.55086	11.32755	.96368	
4	0	.653	.082	530.5	1.096	.63084	12.97212	.83871	489.7	1.005	.58226	11.97316	.91407	484.9	.994	.57655	11.85577	.93202	
5	0	.853	.107	504.9	1.048	.60515	12.44385	.87840	498.1	1.024	.59225	12.17858	.89846	490.9	1.007	.58369	12.02550	.91184	
6	0	1.053	.132	500.5	1.029	.59516	12.27384	.89393	493.3	1.013	.58654	12.04216	.90737	490.9	1.007	.58369	12.02550	.91184	
7	0	1.253	.157	486.1	.997	.57803	11.88622	.92070	487.3	.999	.57940	11.91447	.91854	486.1	.997	.57798	11.88512	.92078	
8	0	1.453	.182	492.1	1.010	.58517	12.03297	.90552	487.3	.999	.57940	11.91447	.91854	489.7	1.005	.58226	11.97316	.91407	
9	0	1.653	.207	484.5	1.002	.58088	11.94492	.91622	486.1	.997	.57798	11.88512	.92078	489.7	1.005	.58226	11.97316	.91407	
10	0	1.853	.232	487.3	.999	.57946	11.91557	.91846	484.9	.994	.57655	11.45577	.92302	488.5	1.002	.58083	11.94381	.91631	
11	0	2.053	.257	487.3	.999	.57946	11.91557	.91846	484.9	.994	.57655	11.85577	.92302	488.5	1.002	.58083	11.94381	.91631	
12	0	2.253	.282	487.3	.999	.57946	11.91557	.91846	483.7	.991	.57512	11.82643	.92527	489.7	1.005	.58226	11.97316	.91407	
13	0	2.453	.307	487.3	.999	.57946	11.91557	.91846	483.7	.991	.57512	11.82643	.92527	489.7	1.005	.58226	11.97316	.91407	
14	0	2.653	.332	486.1	.997	.57803	11.88622	.92070	482.5	.989	.57376	11.79508	.92751	488.5	1.002	.58083	11.94381	.91631	
15	0	2.853	.357	486.1	.997	.57803	11.88622	.92070	487.3	.988	.57227	11.78774	.92826	487.3	.995	.57940	11.91447	.91854	
16	0	3.053	.382	484.9	.994	.57666	11.95687	.92294	480.1	.983	.57884	11.73839	.93201	487.3	.995	.57655	11.85577	.92302	
17	0	3.253	.407	481.3	.984	.57232	11.74883	.92961	478.0	.981	.56941	11.6904	.94242	484.9	.994	.57512	11.95543	.92527	
18	0	3.453	.432	482.5	.989	.57375	11.79818	.92743	478.9	.981	.56799	11.67970	.96511	481.3	.986	.56656	11.60535	.93876	
19	0	3.653	.457	482.5	.989	.57375	11.79818	.92743	477.7	.978	.56513	11.62101	.94102	476.5	.975	.56371	11.59166	.94237	
20	0	3.853	.482	481.3	.989	.57526	11.76883	.92971	475.3	.970	.56371	11.59166	.94327	474.1	.970	.56371	11.59166	.94237	
21	0	4.053	.507	482.5	.989	.57526	11.76883	.92971	474.3	.971	.56231	11.41558	.96866	463.3	.946	.55085	11.32755	.94368	
22	0	4.253	.532	481.7	.985	.56099	11.53404	.94771	466.9	.954	.55514	11.41558	.96866	463.3	.946	.55085	11.32755	.94368	
23	0	4.453	.557	486.1	.936	.54236	11.52520	.97720	467.7	.911	.53231	10.96605	.99348	444.1	.903	.52803	10.08801	1.00041	
24	0	4.653	.582	484.9	.701	.59229	19.58223	.96159	784.8	1.465	.63320	19.19961	.31584	723.7	1.529	.86056	17.69598	.46819	
25	0	4.853	.607	524.2	.578	.98236	20.20062	.18565	807.7	1.717	.96043	19.74968	.24085	744.2	1.575	.88490	19.19654	.42163	
26	0	5.053	.682	839.4	.788	.99811	20.52453	.05194	818.6	1.741	.97333	20.01497	.19688	755.1	1.599	.89779	18.46153	.39551	
27	0	5.253	.853	1.07	.845.5	.1.001	1.00527	20.67177	.00000	824.6	.755	.98050	20.16236	.16796	759.9	1.610	.90352	19.57931	.38349
28	0	5.453	.132	849.1	.809	.0.0957	20.76011	.0.0000	827.0	1.760	.98337	20.22131	.15497	764.7	1.620	.90924	18.69709	.37119	
29	0	5.653	.157	850.5	.812	.0.01100	20.74955	.0.0000	828.2	1.763	.98480	20.25079	.14080	767.1	1.626	.91211	18.75598	.36492	
30	0	5.853	.182	850.5	.812	.0.01100	20.74955	.0.0000	827.0	1.760	.98337	20.22131	.15497	767.1	1.626	.91211	18.75598	.36492	
31	0	6.053	.207	850.5	.812	.0.01100	20.74955	.0.0000	828.2	1.763	.98480	20.25079	.14080	767.1	1.626	.91211	18.75598	.36492	
32	0	6.253	.232	849.1	.809	1.00957	20.76011	.0.0000	827.0	1.760	.98337	20.22131	.14947	767.1	1.626	.91211	18.75598	.36492	
33	0	6.453	.257	849.1	.809	1.00957	20.76011	.0.0000	825.8	1.757	.98193	20.19183	.16159	765.9	1.623	.91068	18.72653	.36060	
34	0	6.653	.282	845.5	.801	1.00527	20.67177	.0.0000	824.6	1.755	.98055	20.16236	.16796	765.9	1.623	.91068	18.72653	.36060	
35	0	6.853	.307	843.0	.794	1.00241	20.61287	.0.0000	819.8	1.744	.97477	20.04445	.19142	758.7	1.607	.90209	18.54987	.38652	
36	0	7.053	.332	839.4	.784	.99811	19.52453	.05194	816.2	1.736	.97047	19.95602	.20739	756.3	1.601	.89922	18.40988	.39253	
37	0	7.253	.357	837.0	.784	.99525	20.46564	.02508	816.2	1.736	.97047	19.95602	.20739	751.1	1.599	.89779	18.46153	.39551	
38	0	7.453	.382	829.8	.766	.98666	20.28986	.13966	807.7	1.717	.96043	19.74968	.24085	747.8	1.583	.88920	18.28487	.41305	
39	0	7.653	.407	825.0	.755	.98093	20.17117	.16108	810.7	1.703	.95327	19.6229	.26238	741.8	1.569	.88204	18.17675	.42728	
40	0	7.853	.432	814.1	.731	.96804	19.96165	.21591	793.3	1.684	.94323	19.35955	.26010	734.6	1.553	.87345	17.96098	.44244	
41	0	8.053	.457	804.5	.706	.95659	19.67057	.25261	783.6	1.663	.93166	19.16163	.31986	725.0	1.531	.8199	17.72543	.45553	
42	0	8.253	.482	790.1	.677	.93946	19.31721	.30108	774.4	1.633	.91590	18.74759	.34028	711.4	1.502	.86274	17.40444	.49425	
43	0	8.453	.507	772.0	.637	.9192	19.65550	.35193	749.9	.587	.88163	18.33478	.49115	693.6	1.484	.85274	16.90388	.51919	
44	0	8.653	.532	733.5	.550	.87210	19.93230	.44652	711.3	.576	.84704	19.50255	.49155	658.7	1.459	.78324	16.10599	.61242	
45	0	8.853	.557	675.6	.454	.80336	19.51755	.56114	656.8	.537	.77981	16.35556	.60681	608.1	1.270	.72310	16.06934	.60662	
46	0	9.053	.582	584.6	.321	.89506	14.26216	.514.0	514.0	.1.061	.61223	12.59942	.87473	490.9	1.007	.58369	12.02550	.91184	
47	0	9.253	.257	594.2	.339	.72239	523.1	.1.080	.62222	12.74948	.87473	.82000	499.9	.1.007	.58369	12.02550	.91184		
48	0	9.453	.382	594.2	.320	.69649	14.32216	.531.0	510.7	.1.072	.61794	12.70681	.85861	487.3	.999	.57940	11.91447	.91854	
49	0	9.653	.407	584.6	.1.39	.65367	13.6170	.1.030	495.7	.1.014	.58939	12.11989	.92921	472.9	.967	.56228	11.56231	.94553	
50	0	9.853	.1.32	578.9	.1.205	.68880	13.1399	.74965	763.0	.1.049	.79702	16.33928	.57866	729.9	.1.610	.90352	18.57931	.38349	
51	0	10.053	.257	587.7	.1.224	.69882	14.37012	.73421	677.5	.1.0425	.40562	16.56615	.56437	761.1	.1.612	.90495	18.60875	.38044	
52	0	10.253	.382	581.7	.1.211	.69166	14.22288	.74524	664.3	.1.396	.78985	16.24190	.59046	745.4	.1.577	.88633	18.22598	.41878	
53	0	10.453	.507	584.0	.1.135	.65157	13.39837	.80654	616.1	.1.288	.73251	15.02821	.618195	692.4	.1.459	.82333	16.93043	.53438	
54	0	10.653	.614	17.0	.053	.0.02026	4.1651	3.19908	16.4	.055	.0.0154	4.0183	.3.22353	16.2	.055	.0.01931	.3.3705	.3.23169	
55	0	10.853	.682	11.6	.066	.0.01382	2.8416	3.44305	11.7	.067	.0.01328	2.7303	3.49096	11.1	.067	.0.01325	.27249	.3.49252	
56	0	10.981	.744	11.0	.067	.0.01306	2.6859	3.50264	10.5	.068	.0.01252	2.57748	3.53245	10.7	.068	.0.01268	.26081	.3.52339	
57	0	6.505	.813	10.7	.068	.0.0268	2.6081	3.52339	10.2	.068	.0.01214	2.4968	3.55423	10.5	.068				

TABLE V.- TABULAR LISTING OF DATA\* FOR SHARP CONE;  $M_\infty = 3.95$  - Concluded(b)  $\alpha = 20^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ, p_t = 5808.2 \text{ psf}$						$\phi = 90.0^\circ, p_t = 5808.2 \text{ psf}$					
			$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$		
2	0	.253	.032	411.7	.830	.48954	10.06660	1.06395	.471.2	.963	.56023	11.52015	.94878	
3	0	.453	.057	462.1	.943	.54949	11.29925	.96588	523.9	1.081	.62295	12.80994	.85086	
4	0	.653	.082	502.9	1.034	.59801	12.29710	.89948	564.7	1.173	.67142	13.80660	.77636	
5	0	.853	.107	510.1	1.050	.60658	12.47320	.87619	574.3	1.194	.68282	14.04110	.75884	
6	0	1.053	.132	511.3	1.053	.60800	12.50254	.87398	576.7	1.199	.68567	14.09973	.75446	
7	0	1.253	.157	510.1	1.050	.60658	12.47320	.87619	577.9	1.202	.68710	14.12904	.75227	
8	0	1.453	.182	517.3	1.067	.61514	12.64629	.86293	586.3	1.221	.69708	14.33424	.73690	
9	0	1.653	.207	518.5	1.069	.61657	12.67864	.86072	587.5	1.224	.69850	14.36355	.73470	
10	0	1.853	.232	519.7	1.072	.61799	12.70799	.85852	588.7	1.226	.69993	14.39286	.73250	
11	0	2.053	.257	520.9	1.075	.61942	12.73733	.85631	588.7	1.226	.69993	14.39286	.73250	
12	0	2.253	.282	522.1	1.077	.62085	12.76668	.85411	589.9	1.229	.70135	14.42218	.73031	
13	0	2.453	.307	522.1	1.077	.62085	12.76668	.85411	591.1	1.232	.70278	14.45149	.72810	
14	0	2.653	.332	522.1	1.077	.62085	12.76668	.85411	589.9	1.229	.70135	14.42218	.73031	
15	0	2.853	.357	520.9	1.075	.61942	12.73733	.85631	587.5	1.224	.69850	14.36355	.73470	
16	0	3.053	.382	519.7	1.072	.61799	12.70799	.85852	586.3	1.221	.69708	14.33424	.73690	
17	0	3.253	.407	516.1	1.064	.61371	12.61994	.86514	580.3	1.207	.68995	14.18767	.74788	
18	0	3.453	.432	513.7	1.059	.61086	12.56124	.86955	576.7	1.199	.68567	14.09973	.75446	
19	0	3.653	.457	508.9	1.048	.60515	12.44385	.87840	569.5	1.183	.67712	13.92385	.76761	
20	0	3.853	.482	502.9	1.034	.59801	12.29710	.86948	562.3	1.167	.66857	13.74797	.78074	
21	0	4.053	.507	496.9	1.021	.59088	12.15036	.90060	550.3	1.140	.65431	13.45484	.80262	
22	0	4.253	.532	480.1	.983	.57089	11.73948	.93192	526.3	1.087	.62580	12.86857	.84647	
23	0	4.453	.557	454.9	.927	.54092	11.12316	.97959	490.3	1.006	.58304	11.98917	.91285	
24	180	.253	.032	629.6	1.318	.74859	15.39341	.65671	517.8	1.068	.61571	12.66102	.86205	
25	180	.453	.057	650.1	1.364	.77301	15.89569	.61779	544.3	1.127	.64721	13.30879	.81353	
26	180	.653	.082	667.8	1.399	.79169	16.27978	.58743	563.6	1.170	.67012	13.77990	.77836	
27	180	.853	.107	670.7	1.410	.79744	16.39797	.57797	572.0	1.189	.68014	13.98601	.76296	
28	180	1.053	.132	676.7	1.423	.80462	16.54570	.56603	580.4	1.208	.69017	14.19212	.74755	
29	180	1.253	.157	680.3	1.431	.80893	16.63433	.55882	584.3	1.219	.69589	14.39990	.73873	
30	180	1.453	.182	682.7	1.437	.81181	16.69343	.55398	587.7	1.224	.69876	14.36879	.73431	
31	180	1.653	.207	682.7	1.437	.81181	16.69343	.55398	587.7	1.224	.69876	14.36879	.73431	
32	180	1.853	.232	684.0	1.440	.81324	16.72297	.55156	591.3	1.232	.70305	14.45712	.72768	
33	180	2.053	.257	682.7	1.437	.81181	16.69343	.55398	591.3	1.232	.70305	14.45712	.72768	
34	180	2.253	.282	682.7	1.437	.81181	16.69343	.55398	591.3	1.232	.70305	14.45712	.72768	
35	180	2.453	.307	677.9	1.426	.80566	16.57524	.56363	586.5	1.221	.69733	14.33934	.73652	
36	180	2.653	.332	675.5	1.421	.80319	16.51615	.56843	586.5	1.221	.69733	14.33934	.73652	
37	180	2.853	.357	675.5	1.421	.80319	16.51615	.56843	586.5	1.221	.69733	14.33934	.73652	
38	180	3.053	.382	670.7	1.410	.79744	16.39797	.57797	584.1	1.216	.69446	14.28045	.74093	
39	180	3.253	.407	665.8	1.399	.79169	16.27978	.58743	584.1	1.216	.69446	14.28045	.74093	
40	180	3.453	.432	659.6	1.383	.78307	16.10251	.60152	574.4	1.194	.68301	14.04490	.75856	
41	180	3.653	.457	648.9	1.361	.77158	15.86614	.62010	568.4	1.181	.67585	13.89768	.76956	
42	180	3.853	.482	638.0	1.337	.75864	15.60023	.64078	561.2	1.165	.66726	13.72101	.78275	
43	180	4.053	.507	622.3	1.302	.73996	15.21613	.67028	549.1	1.138	.65294	13.42657	.80473	
44	180	4.253	.532	590.9	1.231	.70261	14.47794	.72837	525.0	1.084	.62430	12.83769	.84878	
45	180	4.453	.557	547.4	1.134	.65088	13.38429	.80789	492.5	1.011	.58564	12.04269	.90878	
46	90	1.053	.132	493.3	1.013	.58659	12.06231	.90729	499.9	1.028	.59444	12.22367	.89504	
47	90	2.053	.257	484.9	.994	.57660	11.85687	.92924	487.9	1.001	.58019	11.93054	.91732	
48	90	3.053	.382	481.3	.986	.57232	11.76883	.92967	484.4	.993	.57591	11.84260	.92403	
49	90	4.053	.507	471.7	.965	.56090	11.53404	.94771	478.4	.979	.56878	11.69603	.93525	
50	270	1.053	.132	824.1	1.753	.97991	20.15029	.17050	849.0	1.809	1.00948	20.75818	.00000	
51	270	2.053	.257	825.3	1.756	.98135	20.17984	.16421	849.0	1.809	1.00948	20.75818	.00000	
52	270	3.053	.382	807.2	1.716	.95980	19.73665	.24282	829.7	1.766	.98657	20.28708	.13913	
53	270	4.053	.507	750.4	1.588	.89227	18.34800	.40684	773.1	1.639	.91927	18.90320	.34887	
54	0	4.931	.616	15.9	-.056	.01893	.38927	3.24522	15.9	-.056	.01895	.38970	3.24446	
55	0	5.456	.682	10.8	-.067	.01287	.26470	3.51293	10.8	-.067	.01289	.26499	3.51215	
56	0	5.981	.748	10.3	-.068	.01230	.25302	3.54481	10.4	-.068	.01232	.25330	3.54403	
57	0	6.506	.813	10.3	-.068	.01230	.25302	3.54481	10.2	-.069	.01213	.24941	3.55501	
58	0	7.031	.879	10.2	-.069	.01212	.24913	3.55579	10.2	-.069	.01213	.24941	3.55501	
59	180	7.031	.879	10.2	-.069	.01212	.24913	3.55579	10.2	-.069	.01213	.24941	3.55501	
60	180	6.506	.813	10.2	-.069	.01212	.24913	3.55579	10.2	-.069	.01213	.24941	3.55501	
61	180	5.981	.748	10.2	-.069	.01212	.24913	3.55579	10.2	-.069	.01213	.24941	3.55501	
62	180	5.456	.682	10.3	-.068	.01230	.25302	3.54481	10.2	-.069	.01213	.24941	3.55501	
63	180	4.931	.616	10.3	-.068	.01230	.25302	3.54481	10.2	-.069	.01213	.24941	3.55501	

\*The following conversion factors can be used to convert these data to the International System of Units:

$$1 \text{ inch} = 25.4 \text{ mm}; 1 \text{ psf} = 47.88 \text{ N/m}^2$$

TABLE VI.- TABULAR LISTING OF DATA\* FOR SHARP CONE;  $M_{\infty} = 4.63$ (a)  $\alpha = 0^\circ$ 

Orifice	$\theta$ , deg	s, in.	s/d	$\phi = 0.0^\circ$ , $p_t = 7924.4$ psf						$\phi = 22.5^\circ$ , $p_t = 7924.4$ psf						$\phi = 45.0^\circ$ , $p_t = 7924.4$ psf					
				$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$			
2	0	.253	.032	637.3	1.755	.97392	27.33311	.19465	636.7	1.753	.97311	27.31033	.19771	637.4	1.755	.97419	27.34071	.19362			
3	0	.453	.057	626.5	1.724	.95742	26.86983	.25011	625.9	1.722	.95662	26.84744	.25251	626.6	1.724	.95768	26.87731	.24930			
4	0	.653	.082	621.7	1.710	.95008	26.66394	.27147	621.1	1.709	.94929	26.64171	.27368	621.8	1.711	.95034	26.67135	.27072			
5	0	.853	.107	613.3	1.686	.93724	26.30361	.30570	612.7	1.685	.93646	26.28169	.30768	613.4	1.687	.93750	26.31093	.30504			
6	0	1.053	.132	606.1	1.666	.92624	25.99476	.33267	604.4	1.661	.92363	25.92167	.33880	606.2	1.666	.92649	26.01199	.33206			
7	0	1.253	.157	598.1	1.645	.91523	25.68591	.34799	598.4	1.644	.91447	25.66451	.35069	599.0	1.646	.91549	25.69306	.35742			
8	0	1.453	.182	595.3	1.635	.90973	25.53149	.37013	593.6	1.630	.90714	25.45878	.37575	595.4	1.635	.90994	25.53859	.36958			
9	0	1.653	.207	591.7	1.625	.90423	25.37707	.38198	590.0	1.620	.90164	25.30449	.38746	590.6	1.622	.90264	25.33263	.38534			
10	0	1.853	.232	588.1	1.611	.89889	25.17177	.39737	585.2	1.606	.89431	25.09876	.40268	586.8	1.608	.89531	25.12668	.40064			
11	0	2.053	.257	582.1	1.597	.89395	24.95627	.41233	581.6	1.596	.88881	24.94246	.41385	581.0	1.594	.88797	24.92072	.41552			
12	0	2.253	.282	574.5	1.587	.88405	24.81084	.42131	574.8	1.582	.88049	24.73874	.42857	577.4	1.584	.88446	24.76625	.42826			
13	0	2.453	.307	573.7	1.573	.87671	24.64494	.43765	573.2	1.572	.87500	24.56444	.43506	571.4	1.577	.87329	24.51201	.43424			
14	0	2.653	.332	568.9	1.559	.86938	24.39965	.45169	568.4	1.558	.86865	24.37871	.43786	566.6	1.563	.86595	24.32925	.45814			
15	0	2.853	.357	564.1	1.546	.86204	24.19315	.46584	564.6	1.544	.86133	24.17298	.44677	564.0	1.540	.86841	24.05489	.47178			
16	0	3.053	.382	558.1	1.528	.85827	23.91577	.48229	557.6	1.527	.85216	23.91582	.48358	558.9	1.522	.86944	23.83945	.48850			
17	0	3.253	.407	552.1	1.511	.84370	23.47840	.49879	550.4	1.507	.84116	23.60723	.50329	548.6	1.501	.83843	23.53051	.50813			
18	0	3.453	.432	549.9	1.491	.83270	23.36595	.51818	543.2	1.486	.83017	23.29864	.52258	541.4	1.481	.82742	23.22158	.52734			
19	0	3.653	.457	535.2	1.463	.81802	22.95775	.53436	534.8	1.462	.81734	22.93862	.54462	531.8	1.453	.81275	22.86967	.55240			
20	0	3.853	.482	524.4	1.432	.80152	22.49448	.57121	522.8	1.428	.79901	22.42430	.57536	521.0	1.423	.79623	22.34627	.57995			
21	0	4.053	.507	511.2	1.395	.79134	21.92826	.60433	510.8	1.393	.78069	21.91998	.60539	507.8	1.385	.77605	21.77989	.61289			
22	0	4.253	.532	487.2	1.326	.74466	20.98976	.66290	485.6	1.321	.74220	20.82991	.66676	485.0	1.320	.74126	20.80159	.66834			
23	0	4.453	.557	474.6	1.213	.69413	19.2009	.75683	474.3	1.212	.68356	19.18409	.75771	464.4	1.206	.68065	19.10245	.76218			
24	180	.253	.032	644.2	1.775	.98455	27.43121	.14933	644.4	1.775	.98482	27.63890	.14799	642.0	1.768	.98114	27.53557	.16516			
25	180	.453	.057	633.4	1.744	.96798	27.16639	.21611	633.5	1.744	.96825	27.17394	.21518	632.3	1.741	.96641	27.12228	.22146			
26	180	.653	.082	626.1	1.723	.95964	26.86561	.25154	626.3	1.724	.95721	26.86397	.25074	623.9	1.717	.95353	26.76065	.26162			
27	180	.853	.107	620.1	1.706	.94774	26.59827	.27797	620.3	1.706	.94800	26.60567	.27725	615.5	1.693	.94064	26.39902	.20967			
28	180	1.053	.132	617.1	1.682	.93846	26.35374	.31171	609.5	1.675	.93144	26.14071	.32016	608.1	1.672	.92960	26.04905	.32464			
29	180	1.253	.157	608.1	1.671	.92934	26.09180	.32526	606.8	1.665	.92591	25.98573	.33344	603.4	1.658	.92223	25.88241	.34205			
30	180	1.453	.182	602.4	1.651	.92144	25.91698	.34689	598.6	1.644	.91487	25.67576	.35050	597.4	1.641	.91303	25.62410	.36289			
31	180	1.653	.207	597.2	1.631	.91270	25.75169	.36345	596.2	1.638	.90319	25.57244	.36694	592.6	1.627	.90567	25.41745	.37891			
32	180	1.853	.232	591.6	1.610	.90725	25.44743	.39743	591.4	1.610	.90646	25.19314	.39825	589.0	1.607	.90014	25.26247	.39050			
33	180	2.053	.257	587.6	1.613	.89805	25.20380	.40966	586.6	1.610	.89728	25.05582	.40580	584.2	1.603	.89278	25.05582	.40580			
34	180	2.253	.282	584.0	1.603	.89253	25.04886	.44531	584.2	1.603	.88737	24.79751	.42425	583.3	1.589	.88282	24.80468	.44582			
35	180	2.453	.307	579.2	1.589	.88517	24.84227	.42109	571.1	1.586	.88358	24.79751	.42425	573.3	1.572	.87621	24.59087	.43462			
36	180	2.653	.332	573.2	1.572	.87597	24.59403	.46199	572.1	1.569	.87437	24.51921	.44216	567.3	1.555	.86701	24.32356	.45416			
37	180	2.853	.357	564.3	1.558	.86861	24.37744	.46314	567.3	1.555	.86701	24.33256	.45616	562.5	1.541	.85965	24.12591	.46988			
38	180	3.053	.382	562.1	1.541	.85941	24.11921	.47032	561.7	1.538	.85781	24.07425	.47327	556.5	1.524	.85044	23.86761	.48669			
39	180	3.253	.407	556.3	1.523	.85021	23.86697	.48712	554.1	1.517	.84876	23.76428	.49332	550.4	1.507	.84124	23.69930	.50316			
40	180	3.453	.432	547.9	1.499	.83732	23.49944	.51008	549.2	1.503	.83940	23.55764	.50642	542.0	1.483	.82835	23.24767	.52573			
41	180	3.653	.457	539.4	1.475	.82444	23.17971	.53248	537.2	1.469	.82099	23.04102	.53393	533.6	1.459	.81547	22.88604	.54780			
42	180	3.853	.482	529.8	1.448	.80972	22.72747	.55750	526.4	1.438	.80442	22.57607	.56637	522.7	1.428	.79890	22.42109	.57555			
43	180	4.053	.507	514.2	1.403	.78580	22.05332	.59708	513.1	1.400	.78417	22.00779	.59972	509.3	1.386	.77681	21.81115	.61166			
44	180	4.253	.532	488.9	1.331	.74715	20.96873	.65897	487.8	1.328	.74552	20.92920	.66154	483.0	1.314	.73815	20.71626	.67312			
45	180	4.453	.557	452.8	1.227	.69194	19.41932	.76481	452.9	1.228	.69213	19.49472	.74552	448.1	1.214	.68477	19.21807	.75585			
46	90	1.053	.132	609.7	1.676	.93118	26.13345	.32779	610.7	1.679	.93324	26.19237	.31564	610.7	1.679	.93326	26.19237	.31564			
47	90	2.053	.157	594.0	1.603	.88553	25.04886	.40601	584.2	1.603	.89278	25.05582	.40580	585.4	1.607	.89462	25.17748	.40204			
48	90	3.053	.182	557.5	1.527	.82205	23.49262	.44378	557.7	1.527	.85228	23.91927	.48335	560.1	1.534	.85596	24.02259	.47664			
49	90	4.053	.207	509.2	1.389	.77844	21.84473	.60904	509.5	1.390	.78665	21.85281	.60686	509.5	1.390	.77865	21.85281	.60689			
50	0	4.931	.616	1.125	.02214	.62140	3.13869	14.5	.025	.62140	.62140	3.13869	14.7	.026	.62168	.60842	3.15298				
51	270	1.053	.132	609.3	1.675	.93118	26.13345	.32779	610.7	1.679	.93324	26.19237	.31564	610.7	1.679	.93326	26.19237	.31564			
52	270	2.053	.157	594.0	1.603	.88553	25.04886	.40601	584.2	1.603	.89278	25.05582	.40580	585.4	1.607	.89462	25.17748	.40204			
53	270	3.053	.182	557.5	1.527	.82205	23.49262	.44378	557.7	1.527	.85228	23.91927	.48335	560.1	1.534	.85596	24.02259	.47664			
54	0	4.931	.616	1.125	.02214	.62140	3.13869	14.5	.025	.62140	.62140	3.13869	14.7	.026	.62168	.60842	3.15298				
55	0	5.456	.682	9.2	.040	.01411	.39506	.344834	9.0	.041	.01343	.39240	.347293	9.5	.042	.01340	.37590	3.48481			
56	0	5.981	.744	8.8	.042	.01334	.37557	.348559	8.6	.042	.01314	.3875	.349449	8.3	.043	.01267	.35448	3.52432			
57	0																				

TABLE VI.- TABULAR LISTING OF DATA\* FOR SHARP CONE;  $M_\infty = 4.63$  - Continued(a)  $\alpha = 0^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ$ , $p_t = 7915.0$ psf						$\phi = 90.0^\circ$ , $p_t = 7915.0$ psf					
			$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$		
2	0	.253	.032	637.4	1.758	.97536	27.37349	.18911	638.6	1.761	.97720	27.42504	.18182	
3	0	.453	.057	627.8	1.730	.96067	26.96108	.20411	629.0	1.734	.96250	27.01263	.23429	
4	0	.653	.082	623.0	1.716	.95332	26.75488	.26222	624.2	1.720	.95516	26.80643	.25685	
5	0	.853	.107	614.6	1.692	.94046	26.39402	.29743	615.8	1.696	.94230	26.44557	.29262	
6	0	1.053	.132	607.4	1.672	.92944	26.0472	.32501	608.6	1.675	.93128	26.13627	.32055	
7	0	1.253	.157	600.2	1.651	.91842	25.77541	.35080	601.4	1.654	.92026	25.82696	.34661	
8	0	1.453	.182	595.4	1.637	.91017	25.56921	.36719	597.8	1.644	.91475	25.67231	.35907	
9	0	1.653	.207	590.6	1.624	.90373	25.36301	.34305	593.0	1.630	.90740	25.46611	.37518	
10	0	1.853	.232	585.8	1.610	.89638	25.15680	.39943	588.2	1.617	.90005	25.25991	.39079	
11	0	2.053	.257	581.0	1.596	.88903	24.95060	.41339	583.4	1.603	.89270	25.05370	.40595	
12	0	2.253	.282	577.4	1.586	.88352	24.79595	.42436	578.6	1.589	.88536	24.84750	.42072	
13	0	2.453	.307	572.6	1.572	.87617	24.58974	.43870	573.8	1.575	.87801	24.64130	.43514	
14	0	2.653	.332	567.8	1.558	.86881	24.38354	.45273	569.0	1.562	.87066	24.43509	.44925	
15	0	2.853	.357	561.8	1.541	.85964	24.12579	.46489	564.2	1.548	.86332	24.22889	.46307	
16	0	3.053	.382	555.8	1.524	.85046	23.86803	.48666	558.2	1.531	.85413	23.97113	.47999	
17	0	3.253	.407	549.8	1.507	.84127	23.61028	.50310	551.0	1.510	.84311	23.66183	.49984	
18	0	3.453	.432	541.4	1.483	.82842	23.24942	.52562	543.8	1.490	.83209	23.35252	.51924	
19	0	3.653	.457	531.8	1.455	.81372	22.83702	.55075	535.4	1.466	.81923	22.99167	.54140	
20	0	3.853	.482	521.0	1.424	.79719	22.37306	.57838	523.4	1.431	.80086	22.47616	.57229	
21	0	4.053	.507	507.8	1.387	.77698	21.80600	.61139	510.2	1.393	.78066	21.90910	.60544	
22	0	4.253	.532	483.8	1.318	.74025	20.77498	.66983	485.0	1.321	.74208	20.82653	.66695	
23	0	4.453	.557	445.4	1.208	.68147	19.12536	.76093	446.6	1.211	.68331	19.17691	.75810	
24	180	.253	.032	639.6	1.764	.97863	27.46514	.17595	639.3	1.763	.97829	27.45558	.17736	
25	180	.453	.057	628.7	1.733	.96204	26.99963	.23577	627.3	1.729	.95990	26.93950	.24251	
26	180	.653	.082	620.3	1.709	.94914	26.63757	.27409	622.5	1.715	.95254	26.73307	.26446	
27	180	.853	.107	611.9	1.684	.93624	26.27550	.30824	611.7	1.684	.93599	26.26859	.30886	
28	180	1.053	.132	604.6	1.664	.92518	25.96516	.33517	604.5	1.663	.92496	25.95894	.33569	
29	180	1.253	.157	599.8	1.650	.91781	25.7827	.36219	599.7	1.650	.91760	25.75251	.35265	
30	180	1.453	.182	596.2	1.640	.91228	25.60310	.36454	593.7	1.632	.90841	25.49447	.37300	
31	180	1.653	.207	590.2	1.622	.90307	25.34448	.38445	588.9	1.619	.90105	25.28803	.38869	
32	180	1.853	.232	585.4	1.609	.89569	25.13759	.39984	585.3	1.608	.89554	25.13321	.40016	
33	180	2.053	.257	579.3	1.591	.88648	24.87897	.41849	580.5	1.594	.88818	24.92678	.41509	
34	180	2.253	.282	576.9	1.584	.88279	24.77552	.42980	575.7	1.581	.88083	24.72034	.42966	
35	180	2.453	.307	572.1	1.571	.87542	24.5863	.44015	570.8	1.567	.87347	24.51391	.44389	
36	180	2.653	.332	564.9	1.550	.86436	24.25829	.46112	564.8	1.550	.86428	24.25587	.46128	
37	180	2.853	.357	560.1	1.536	.85699	24.05176	.47476	561.2	1.539	.85876	24.10105	.47151	
38	180	3.053	.382	554.1	1.519	.84778	23.79728	.49149	555.2	1.522	.84957	23.84300	.48827	
39	180	3.253	.407	548.0	1.502	.83856	23.53416	.50790	549.2	1.505	.84037	23.58496	.50470	
40	180	3.453	.432	539.6	1.478	.82566	23.17210	.53038	539.6	1.478	.82566	23.17210	.53038	
41	180	3.653	.457	531.2	1.453	.81276	22.81003	.55238	531.2	1.453	.81279	22.81084	.55233	
42	180	3.853	.482	520.3	1.422	.79617	22.34452	.58006	520.4	1.423	.79624	22.34637	.57995	
43	180	4.053	.507	507.1	1.384	.77590	21.77556	.61314	507.2	1.385	.77601	21.77867	.61296	
44	180	4.253	.532	481.8	1.312	.73720	20.68937	.67462	480.7	1.309	.73556	20.64329	.67719	
45	180	4.453	.557	445.7	1.209	.68619	19.13767	.76025	447.1	1.213	.68407	19.19826	.75693	
46	90	1.053	.132	605.0	1.665	.92577	25.98162	.33378	605.0	1.665	.92577	25.98162	.33378	
47	90	2.053	.257	579.8	1.593	.88719	24.89905	.41707	581.0	1.596	.88903	24.95060	.41339	
48	90	3.053	.382	555.8	1.524	.85046	23.86803	.48666	555.8	1.524	.85046	23.86803	.48666	
49	90	4.053	.507	506.6	1.383	.77515	21.75445	.61435	507.8	1.387	.77698	21.89600	.61139	
50	270	1.053	.132	610.7	1.681	.93440	26.22378	.31286	611.7	1.684	.93599	26.26859	.30886	
51	270	2.053	.257	586.6	1.612	.89754	25.18931	.39603	588.9	1.619	.90105	25.28803	.38869	
52	270	3.053	.382	561.3	1.540	.85883	24.10312	.47138	562.4	1.543	.86060	24.15265	.46812	
53	270	4.053	.507	513.1	1.402	.78511	22.03418	.59819	514.4	1.405	.78704	22.08832	.59504	
54	0	4.931	.616	14.2	-.026	.02170	.60915	.315217	14.2	-.026	.02170	.60915	.315217	
55	0	5.456	.682	8.8	-.042	.01341	.37644	.348397	8.6	-.042	.01317	.36960	.349687	
56	0	5.981	.748	8.3	-.043	.01268	.35591	.352348	8.1	-.043	.01244	.34906	.353720	
57	0	6.506	.813	8.1	-.043	.01244	.34906	.352720	8.0	-.044	.01219	.34222	.355122	
58	0	7.031	.879	7.8	-.044	.01195	.33537	.356554	7.8	-.044	.01195	.33537	.356554	
59	180	7.031	.879	7.7	-.045	.01171	.32853	.358019	7.8	-.044	.01195	.33537	.356554	
60	180	6.506	.813	7.7	-.045	.01171	.32853	.358019	8.0	-.044	.01219	.34222	.355122	
61	180	5.981	.748	7.7	-.045	.01171	.32853	.358019	7.8	-.044	.01195	.33537	.356554	
62	180	5.456	.682	7.7	-.045	.01171	.32853	.358019	7.8	-.044	.01195	.33537	.356554	
63	180	4.931	.616	7.7	-.045	.01171	.32853	.358019	7.8	-.044	.01195	.33537	.356554	

\*The following conversion factors can be used to convert these data to the International System of Units:

1 inch = 25.4 mm; 1 psf = 47.88 N/m<sup>2</sup>.

TABLE VI.- TABULAR LISTING OF DATA\* FOR SHARP CONE;  $M_\infty = 4.63$  - Continued(b)  $\alpha = 10^\circ$ 

Orifice	$\theta$ , deg	s, in.	s/d	$\phi = 0.0^\circ$ , $p_t = 7924.4$ psf					$\phi = 22.5^\circ$ , $p_t = 7924.4$ psf					$\phi = 45.0^\circ$ , $p_t = 7924.4$ psf				
				$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$
2	0	.253	.032	512.6	1.399	.78339	21,9584	.60100	512.1	1.397	.78259	21,94345	.60226	507.8	1.385	.77605	21,77989	.61289
3	0	.453	.057	506.6	1.381	.77422	21,72840	.61585	504.9	1.376	.77160	21,65648	.60507	505.4	1.378	.77238	21,67691	.61880
4	0	.653	.082	513.6	1.402	.78523	22,0733	.59801	510.9	1.394	.78076	21,91201	.60527	515.0	1.405	.78706	22,04982	.59502
5	0	.853	.107	510.2	1.392	.77972	21,88276	.60695	507.3	1.383	.77526	21,75770	.61414	511.4	1.395	.78156	21,93425	.60398
6	0	1.053	.132	503.0	1.371	.76871	21,57393	.62470	502.5	1.370	.76793	21,55196	.62595	506.6	1.381	.77422	21,72840	.61585
7	0	1.253	.157	496.8	1.350	.75771	21,26499	.64226	496.5	1.352	.75877	21,29477	.64058	501.8	1.368	.76688	21,52244	.62764
8	0	1.453	.182	495.8	1.350	.75771	21,24499	.64226	495.3	1.349	.75694	21,24334	.64349	501.8	1.368	.76688	21,52244	.62764
9	0	1.653	.207	491.4	1.344	.75404	21,16202	.64809	494.1	1.346	.75510	21,19190	.66460	499.4	1.361	.76321	21,41946	.63350
10	0	1.853	.232	491.0	1.337	.75037	21,05904	.65389	491.7	1.339	.75144	21,08903	.65220	498.2	1.357	.76138	21,36797	.63643
11	0	2.053	.257	491.0	1.337	.75037	21,05904	.65389	490.5	1.335	.74960	21,03759	.65510	497.0	1.354	.75954	21,31648	.63935
12	0	2.253	.282	489.8	1.333	.74853	21,0755	.65679	489.3	1.332	.74777	20,98615	.65799	495.8	1.350	.75771	21,26499	.64226
13	0	2.453	.307	488.6	1.330	.74670	20,95606	.65968	488.1	1.328	.74594	20,91472	.66088	493.4	1.344	.75604	21,16202	.64009
14	0	2.653	.332	486.2	1.323	.74303	20,85308	.66546	486.9	1.325	.74411	20,88328	.66377	491.0	1.337	.75037	21,05904	.65389
15	0	2.853	.357	486.2	1.323	.74303	20,85308	.66546	484.5	1.318	.74044	20,76041	.66953	488.6	1.330	.74670	20,95606	.65968
16	0	3.053	.382	483.8	1.316	.73936	20,75010	.67122	483.3	1.315	.73861	20,72997	.67241	486.2	1.323	.74303	20,85308	.66546
17	0	3.253	.407	482.6	1.313	.73753	20,69861	.67410	479.7	1.304	.73311	20,57466	.68101	483.8	1.316	.73936	20,75010	.67122
18	0	3.453	.432	477.8	1.299	.73019	20,49266	.68558	477.3	1.298	.72944	20,47179	.68674	480.2	1.306	.73386	20,59564	.67985
19	0	3.653	.457	477.8	1.299	.73019	20,49266	.68558	473.7	1.287	.72395	20,31748	.69531	475.4	1.292	.72652	20,34968	.69130
20	0	3.853	.482	471.8	1.282	.72017	20,21521	.69291	468.9	1.274	.70551	20,11133	.70617	468.2	1.272	.71551	20,04075	.70441
21	0	4.053	.507	468.2	1.272	.71551	20,0475	.70841	466.1	1.269	.70584	19,91998	.71805	462.2	1.254	.72044	19,93330	.72265
22	0	4.253	.532	459.0	1.264	.69533	18,51437	.72900	459.0	1.222	.69612	19,34018	.71915	456.6	1.210	.69249	19,35754	.72556
23	0	4.453	.557	452.8	1.262	.65680	18,43309	.70880	424.5	1.147	.64880	18,20857	.81109	414.6	1.266	.63662	17,88671	.82981
24	180	.253	.032	662.5	1.827	1,01243	28,41382	.00000	652.9	1.800	.99780	28,00312	.05613	626.3	1.724	.98721	26,88397	.25074
25	180	.453	.057	662.5	1.827	1,01243	28,41382	.00000	652.9	1.800	.99780	28,00312	.05613	626.1	1.720	.99537	26,81231	.25263
26	180	.653	.082	663.7	1.830	1,01427	28,46548	.00000	651.7	1.796	.99596	27,95415	.07610	622.7	1.713	.95169	26,70899	.26692
27	180	.853	.107	657.6	1.813	1,00507	28,20717	.00000	645.7	1.779	.98675	27,69312	.13816	620.3	1.706	.94800	26,60567	.27725
28	180	1.053	.132	652.8	1.799	.99771	28,00053	.05730	642.0	1.769	.98123	27,53812	.16475	615.5	1.693	.94064	26,39902	.29697
29	180	1.253	.157	650.4	1.792	.99402	27,89720	.09258	639.6	1.762	.97755	27,43749	.18041	613.1	1.688	.93696	26,29570	.30642
30	180	1.453	.182	645.6	1.779	.98666	27,69056	.13864	633.6	1.744	.96834	27,17666	.21487	609.5	1.675	.93144	26,14071	.32016
31	180	1.653	.207	644.4	1.775	.98482	27,63890	.14799	632.4	1.741	.96650	27,12479	.22116	605.8	1.665	.92591	25,98573	.33344
32	180	1.853	.232	639.6	1.761	.97746	27,43225	.18078	630.0	1.734	.96282	27,02146	.23328	603.4	1.658	.92223	25,88241	.34205
33	180	2.053	.257	638.4	1.758	.97567	27,30559	.18813	625.2	1.720	.95546	26,81480	.25597	598.6	1.644	.91487	25,67576	.35880
34	180	2.253	.282	632.3	1.741	.96641	27,12228	.22146	621.6	1.710	.94993	26,65980	.27188	595.2	1.638	.91119	25,57244	.36694
35	180	2.453	.307	626.3	1.724	.95721	26,86397	.25074	615.5	1.693	.94073	26,40147	.29674	591.4	1.624	.90383	25,36579	.38284
36	180	2.653	.332	622.7	1.713	.95169	26,70899	.26692	610.7	1.679	.93336	26,19480	.31542	586.6	1.610	.89646	25,15914	.39825
37	180	2.843	.357	616.7	1.696	.94248	26,44068	.29214	605.0	1.665	.92660	25,98814	.33232	581.8	1.596	.88910	24,95250	.41325
38	180	3.053	.382	610.7	1.670	.93328	26,19237	.31564	599.9	1.648	.91680	25,79891	.35448	575.7	1.579	.87989	24,69419	.43148
39	180	3.253	.407	603.4	1.658	.92223	25,86241	.34205	593.9	1.631	.90759	25,47147	.37477	569.7	1.562	.87069	24,43588	.44920
40	180	3.453	.432	596.2	1.638	.91119	25,57244	.36844	586.4	1.607	.89740	25,10981	.40187	562.5	1.541	.85965	24,12591	.46988
41	180	3.653	.457	581.6	1.607	.90442	25,31448	.40564	574.0	1.576	.87474	24,68215	.44735	554.1	1.517	.84876	23,76707	.49335
42	180	3.853	.482	574.5	1.576	.89705	24,61253	.42506	562.5	1.541	.85973	24,12815	.44735	542.0	1.483	.83476	23,24767	.52575
43	180	4.053	.507	559.5	1.524	.85044	23,87641	.48659	548.4	1.500	.83763	23,59316	.50955	524.6	1.441	.80526	22,62773	.56326
44	180	4.253	.532	528.8	1.445	.80810	22,67939	.50221	518.0	1.414	.79161	22,41550	.54997	499.0	1.362	.76293	21,3952	.53246
45	180	4.453	.557	489.4	1.321	.74784	20,81958	.66734	477.0	1.297	.72902	20,45984	.68740	461.3	1.252	.70503	19,78635	.72464
46	90	1.053	1.132	548.6	1.501	.83843	23,53051	.5013	520.5	1.421	.79542	22,32350	.51829	506.6	1.381	.77422	21,72840	.61585
47	90	2.053	.257	537.8	1.471	.82192	23,04711	.53680	510.9	1.394	.78076	21,91201	.60527	495.8	1.350	.75771	21,26499	.64226
48	90	3.053	.382	519.8	1.419	.79444	22,24978	.58298	496.5	1.352	.75877	21,29477	.64058	485.0	1.320	.74120	20,80159	.66834
49	90	4.053	.507	480.4	1.306	.73386	20,59564	.67985	464.1	1.260	.70928	19,90598	.71805	458.6	1.244	.70983	19,68883	.73111
50	270	1.053	1.132	551.6	1.510	.84308	23,66096	.49989	586.6	1.610	.89655	25,16148	.39808	620.3	1.706	.94800	26,66567	.27725
51	270	2.053	.257	539.6	1.476	.82467	23,14435	.53208	572.2	1.569	.87445	23,61149	.44201	603.4	1.658	.92223	25,88241	.34205
52	270	3.053	.382	521.5	1.424	.79706	22,34942	.57859	550.5	1.507	.84139	23,61149	.50302	579.3	1.589	.88542	24,84918	.42061
53	270	4.053	.507	481.8	1.310	.73631	20,64640	.67600	504.7	1.376	.77136	21,66817	.62045	530.0	1.448	.80995	22,73105	.55712
54	0	4.931	616	1.423	.0226	.02190	.61458	3,14616	13.0	.027	.02119	.59475	3,16838	13.7	.028	.02093	.58726	.3,17697
55	0	5.456	.682	8.8	.042	.01338	.37557	.3,46559	8.3	.043	.01267	.35548	3,52432	8.0	.044	.01217	.34143	.3,55285
56	0	5.981	.744	8.0	.044	.01217	.34143	.3,55285	7.7	.045	.01169	.32814	.3,5104	7.5	.045	.01144	.32095	.3,59681
5																		

TABLE VI.- TABULAR LISTING OF DATA\* FOR SHARP CONE;  $M_\infty = 4.63$  - Continued(b)  $\alpha = 10^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ, p_t = 7915.0 \text{ psf}$						$\phi = 90.0^\circ, p_t = 7915.0 \text{ psf}$					
			$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l, \text{ psf}$	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$		
2	0	.253	.032	511.4	1.397	.78249	21.96065	.60246	531.8	1.455	.81372	22.83702	.55075	
3	0	.453	.057	516.2	1.411	.78984	22.16686	.59047	541.4	1.483	.82842	23.24942	.52562	
4	0	.653	.082	527.0	1.441	.80637	22.63081	.58311	552.2	1.514	.84495	23.71338	.49656	
5	0	.853	.107	524.6	1.435	.80270	22.52771	.56924	551.0	1.510	.84311	23.66183	.49984	
6	0	1.053	.132	519.8	1.421	.79535	22.32151	.58141	547.4	1.500	.83760	23.50718	.50959	
7	0	1.253	.157	517.4	1.414	.79168	22.21841	.58745	545.0	1.493	.83393	23.40408	.51604	
8	0	1.453	.182	517.4	1.414	.79168	22.21841	.58745	543.8	1.490	.83209	23.35252	.51924	
9	0	1.653	.207	515.0	1.407	.78800	22.11531	.59347	543.8	1.490	.83209	23.35252	.51924	
10	0	1.853	.232	513.8	1.404	.78617	22.06375	.59647	541.4	1.483	.82842	23.24942	.52562	
11	0	2.053	.257	511.4	1.397	.78249	21.96065	.60246	537.8	1.472	.82290	23.09477	.53512	
12	0	2.253	.282	510.2	1.393	.78066	21.99910	.60544	536.6	1.469	.82107	23.04322	.53826	
13	0	2.453	.307	507.8	1.387	.77698	21.80600	.61139	533.0	1.459	.81556	22.88857	.54764	
14	0	2.653	.332	505.4	1.380	.77331	21.70290	.61731	529.4	1.448	.81005	22.73391	.55695	
15	0	2.853	.357	501.8	1.369	.76780	21.54825	.62616	525.8	1.438	.80454	22.57926	.56618	
16	0	3.053	.382	499.4	1.362	.76413	21.44514	.63204	522.2	1.428	.79903	22.42461	.57534	
17	0	3.253	.407	494.6	1.349	.75678	21.23894	.64374	516.2	1.411	.78984	22.16686	.59047	
18	0	3.453	.432	489.8	1.335	.74943	21.03274	.65537	511.4	1.397	.78249	21.96065	.60246	
19	0	3.653	.457	483.8	1.318	.74025	20.77498	.66983	503.0	1.373	.76964	21.59980	.62322	
20	0	3.853	.482	476.6	1.297	.72923	20.46568	.68708	493.4	1.345	.75494	21.18739	.64665	
21	0	4.053	.507	467.0	1.270	.71453	20.05327	.70993	483.8	1.318	.74025	20.77498	.66983	
22	0	4.253	.532	449.0	1.218	.68698	19.28001	.75245	461.0	1.253	.70535	19.79552	.72414	
23	0	4.453	.557	416.6	1.125	.63738	17.88814	.82863	425.0	1.149	.65024	18.24899	.80887	
24	180	.253	.032	585.4	1.609	.89569	25.17559	.39984	545.6	1.495	.83488	23.43071	.51437	
25	180	.453	.057	585.4	1.609	.89569	25.13759	.39984	548.0	1.502	.83856	23.53416	.50790	
26	180	.653	.082	585.4	1.609	.89569	25.13759	.39984	548.0	1.502	.83856	23.53416	.50790	
27	180	.853	.107	584.2	1.605	.89385	25.04586	.40362	548.0	1.502	.83856	23.53416	.50790	
28	180	1.053	.132	581.8	1.598	.89016	24.98242	.41110	548.0	1.502	.83856	23.53416	.50790	
29	180	1.253	.157	579.3	1.591	.88648	24.87897	.41849	545.6	1.495	.83488	23.43071	.51437	
30	180	1.453	.182	574.5	1.578	.87911	24.67208	.43301	543.2	1.488	.83119	23.32727	.52081	
31	180	1.653	.207	573.3	1.574	.87726	24.62035	.43659	542.0	1.484	.82935	23.27554	.52401	
32	180	1.853	.232	572.1	1.571	.87542	24.56863	.44015	538.4	1.474	.82382	23.12037	.53355	
33	180	2.053	.257	567.3	1.557	.86805	24.36174	.45420	536.0	1.467	.82013	23.01693	.53986	
34	180	2.253	.282	564.9	1.550	.86346	24.25289	.46112	533.6	1.460	.81645	22.91348	.54614	
35	180	2.453	.307	561.3	1.540	.85883	24.10312	.47138	530.0	1.450	.81092	22.75831	.55548	
36	180	2.653	.332	555.3	1.522	.84962	23.84450	.48018	526.4	1.440	.80539	22.60314	.56476	
37	180	2.853	.357	552.8	1.515	.84593	23.74105	.49480	523.9	1.433	.80170	22.49969	.57090	
38	180	3.053	.382	548.0	1.502	.83856	23.53416	.50790	517.9	1.416	.79249	22.24108	.54613	
39	180	3.253	.407	542.0	1.484	.82935	23.27554	.52401	513.1	1.402	.78511	22.03418	.59819	
40	180	3.453	.432	536.0	1.467	.82013	23.01693	.53986	507.1	1.384	.77590	21.77556	.61314	
41	180	3.653	.457	526.4	1.440	.80539	22.60314	.56476	499.9	1.364	.76484	21.46522	.63090	
42	180	3.853	.482	515.5	1.409	.78880	22.13763	.59217	490.2	1.336	.75010	21.05144	.65432	
43	180	4.053	.507	502.3	1.371	.76853	21.56867	.62500	478.2	1.302	.73167	20.53420	.68327	
44	180	4.253	.532	477.0	1.298	.72982	20.48248	.68614	456.5	1.240	.69849	19.60318	.73472	
45	180	4.453	.557	439.6	1.191	.67269	18.87905	.77441	422.8	1.143	.64689	18.15492	.81402	
46	90	1.053	.132	500.6	1.366	.76596	21.49670	.62910	499.4	1.362	.76413	21.44514	.63204	
47	90	2.053	.257	489.8	1.335	.74943	21.03274	.65537	487.4	1.328	.74576	20.92964	.66117	
48	90	3.053	.382	481.4	1.311	.73657	20.67188	.67559	480.2	1.308	.73474	20.62033	.67847	
49	90	4.053	.507	459.8	1.249	.70351	19.74397	.72698	462.2	1.256	.70718	19.84707	.72130	
50	270	1.053	.132	640.8	1.767	.98047	27.51687	.16809	649.2	1.791	.99337	27.87893	.09751	
51	270	2.053	.257	625.1	1.722	.95651	26.84446	.25283	632.3	1.743	.96757	27.15480	.21753	
52	270	3.053	.382	599.8	1.650	.91781	25.75827	.35219	605.8	1.667	.92702	26.01689	.33080	
53	270	4.053	.507	548.0	1.502	.83856	23.53416	.50790	552.8	1.515	.84593	23.74105	.49480	
54	0	4.931	.616	13.4	.028	.02046	.57429	3.19214	13.2	-.029	.02024	.56808	3.19953	
55	0	5.456	.682	7.8	.044	.01194	.33500	3.56633	7.7	-.045	.01171	.32853	3.58019	
56	0	5.981	.748	7.3	.046	.01121	.31449	3.61129	7.2	-.046	.01097	.30800	3.62620	
57	0	6.506	.813	7.2	.046	.01096	.30766	3.62699	7.0	-.047	.01073	.30115	3.64229	
58	0	7.031	.879	7.2	.046	.01096	.30766	3.62699	7.2	-.046	.01097	.30800	3.62620	
59	180	7.031	.879	7.2	.046	.01096	.30766	3.62699	7.2	-.046	.01097	.30800	3.62620	
60	180	6.506	.813	7.2	.046	.01096	.30766	3.62699	7.2	-.046	.01097	.30800	3.62620	
61	180	5.981	.748	7.2	.046	.01096	.30766	3.62699	7.0	-.047	.01073	.30115	3.64229	
62	180	5.456	.682	7.2	.046	.01096	.30766	3.62699	7.0	-.047	.01073	.30115	3.64229	
63	180	4.931	.616	7.2	.046	.01096	.30766	3.62699	7.2	-.046	.01097	.30800	3.62620	

\*The following conversion factors can be used to convert these data to the International System of Units:

$$1 \text{ inch} = 25.4 \text{ mm}; 1 \text{ psf} = 47.88 \text{ N/m}^2$$

TABLE VI.- TABULAR LISTING OF DATA\* FOR SHARP CONE;  $M_\infty = 4.63$  - Continued(c)  $\alpha = 20^\circ$ 

Orifice	$\theta$ , deg	s, in.	s/d	$\phi = 0.0^\circ$ , $p_t = 7924.4$ psf					$\phi = 22.5^\circ$ , $p_t = 7924.4$ psf					$\phi = 45.0^\circ$ , $p_t = 7924.4$ psf				
				$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_{\infty}$	$M_l$
2	0	.253	.032	358.9	.959	.54856	15.39524	.96736	327.4	.869	.50035	14.04220	1.04588	303.4	.801	.46365	13.01227	1.10813
3	0	.453	.057	357.7	.956	.54672	15.34745	.97028	345.4	.921	.52784	14.18133	1.00709	328.6	.872	.50213	14.09234	1.04291
4	0	.653	.082	381.7	1.025	.58342	16.37353	.91226	351.4	.938	.53700	15.07094	.98590	345.3	.920	.52779	14.81238	1.00880
5	0	.853	.107	364.9	.976	.55773	15.65268	.95274	347.4	.955	.54617	15.38112	.97118	350.1	.934	.53512	15.01811	.98633
6	0	1.053	.132	360.1	.963	.55039	15.44673	.96443	354.0	.948	.54250	15.22525	.97716	350.1	.934	.53512	15.01811	.98633
7	0	1.253	.157	347.3	.924	.54949	14.98433	.98138	351.4	.938	.53129	15.07094	.98490	344.9	.929	.53229	14.96148	.99389
8	0	1.453	.182	354.5	.946	.54122	15.10228	.97912	354.4	.938	.53700	15.07094	.98590	351.3	.938	.53695	15.06954	.98598
9	0	1.653	.207	354.1	.946	.54122	15.10228	.97912	349.0	.931	.53334	14.94866	.99181	351.3	.938	.53695	15.06954	.98598
10	0	1.853	.232	350.5	.935	.53572	14.93481	.98797	349.0	.931	.53334	14.94866	.99181	351.3	.938	.53695	15.06954	.98598
11	0	2.053	.257	350.5	.935	.53572	14.93481	.98797	349.0	.931	.53334	14.94866	.99181	351.3	.938	.53695	15.06954	.98598
12	0	2.253	.282	350.5	.935	.53572	14.93481	.98797	349.0	.931	.53334	14.94866	.99181	351.3	.938	.53695	15.06954	.98598
13	0	2.453	.307	350.5	.935	.53572	14.93481	.98797	349.0	.931	.53334	14.94866	.99181	352.5	.941	.53879	15.12097	.99303
14	0	2.653	.332	350.5	.935	.53572	14.93481	.98797	347.8	.927	.52150	14.91663	.99478	352.5	.941	.53879	15.12097	.99303
15	0	2.853	.357	350.5	.935	.53572	14.93481	.98797	347.8	.927	.53150	14.91663	.99478	351.3	.938	.53695	15.06954	.98598
16	0	3.053	.382	349.3	.932	.53388	14.94333	.99094	347.8	.927	.53150	14.91663	.99478	351.3	.938	.53695	15.06954	.98598
17	0	3.253	.407	349.3	.932	.53388	14.94333	.99094	347.8	.927	.53150	14.91663	.99478	350.1	.934	.53512	15.01811	.98893
18	0	3.453	.432	349.1	.928	.53205	14.93184	.99390	346.6	.924	.52967	14.86519	.99775	350.1	.934	.53512	15.01811	.98893
19	0	3.653	.457	348.1	.928	.53205	14.93184	.99390	346.6	.924	.52967	14.86519	.99775	348.9	.931	.53329	14.96668	.99189
20	0	3.853	.482	346.9	.925	.53021	14.88035	.99687	345.4	.921	.52784	14.81375	1.00072	346.5	.924	.52962	14.86381	.99783
21	0	4.053	.507	348.1	.928	.53205	14.93184	.99390	344.2	.917	.52601	14.76232	1.00370	345.3	.920	.52779	14.81238	1.00080
22	0	4.253	.532	344.5	.918	.52654	14.77737	1.00282	339.4	.903	.51867	14.55567	1.01565	339.3	.903	.51863	14.55522	1.01573
23	0	4.453	.557	333.7	.887	.51003	14.31397	.907984	327.4	.869	.50035	14.04220	.91588	325.0	.862	.49664	13.93804	1.05206
24	180	.253	.032	614.3	1.689	.93880	26.34736	.30172	599.9	1.648	.91680	25.72981	.35488	549.8	1.505	.84034	23.53396	.50476
25	180	.453	.057	633.5	1.744	.96825	27.17394	.21518	616.7	1.696	.94257	26.45313	.29191	564.3	1.546	.86245	24.20459	.46468
26	180	.653	.082	644.4	1.775	.98482	27.63890	.14799	626.4	1.724	.95738	26.86664	.25047	572.8	1.570	.87535	24.56662	.44029
27	180	.853	.107	650.4	1.792	.99402	27.49720	.09258	632.4	1.741	.96650	27.12479	.22116	577.6	1.584	.88272	24.77350	.42594
28	180	1.053	.132	651.6	1.796	.99586	27.94887	.07697	632.4	1.741	.96650	27.12479	.22116	581.2	1.595	.88825	24.92866	.41496
29	180	1.253	.157	654.0	1.803	.99585	28.05219	.02547	636.0	1.751	.97020	27.27979	.20174	584.8	1.605	.89374	25.04382	.40377
30	180	1.453	.182	654.8	1.803	.99585	28.05219	.02547	636.0	1.751	.97020	27.27979	.20174	584.8	1.605	.89374	25.04382	.40377
31	180	1.653	.207	656.4	1.810	.99585	28.15551	.00007	637.2	1.755	.97387	27.33146	.19487	584.8	1.605	.89374	25.04382	.40377
32	180	1.853	.232	656.4	1.810	.99585	28.15551	.00007	637.2	1.755	.97387	27.33146	.19487	584.8	1.605	.89374	25.04382	.40377
33	180	2.053	.257	656.4	1.810	.99586	27.94887	.07597	634.8	1.748	.97018	27.22818	.20840	584.8	1.605	.89378	25.04382	.40377
34	180	2.253	.282	651.6	1.796	.99586	27.94887	.07597	634.8	1.748	.97018	27.22818	.20840	584.8	1.605	.89378	25.04382	.40377
35	180	2.453	.307	651.6	1.796	.99586	27.94887	.07597	633.6	1.744	.96834	27.17646	.21487	582.4	1.598	.89009	24.90038	.41125
36	180	2.653	.332	646.8	1.782	.98850	27.74222	.12864	630.0	1.734	.96282	27.02146	.23238	578.9	1.588	.88456	24.82522	.42230
37	180	2.853	.357	646.8	1.782	.98850	27.74222	.12864	627.6	1.727	.95914	26.91813	.24886	575.2	1.577	.87904	24.47005	.43315
38	180	3.053	.382	640.8	1.765	.97930	27.49391	.17133	624.0	1.717	.95361	26.74313	.26137	572.9	1.570	.87535	24.56662	.44029
39	180	3.253	.407	639.4	1.758	.97562	27.30509	.18813	622.8	1.713	.95177	26.71146	.26667	567.9	1.557	.86795	24.15975	.45433
40	180	3.453	.432	632.3	1.741	.96641	27.12226	.22146	614.3	1.683	.93889	26.34980	.30150	563.1	1.543	.86061	24.15287	.46810
41	180	3.653	.457	623.9	1.717	.95353	26.76065	.26162	605.9	1.665	.92600	25.98814	.33323	555.9	1.522	.84955	23.84256	.48830
42	180	3.853	.482	614.3	1.689	.93880	26.34736	.30172	596.3	1.638	.91127	25.54784	.36676	546.2	1.495	.83481	23.42880	.51449
43	180	4.053	.507	598.6	1.644	.91487	25.67576	.35800	581.8	1.596	.88918	24.95481	.41308	534.2	1.460	.81638	22.91161	.54625
44	180	4.253	.532	572.1	1.569	.97437	24.53921	.44216	554.1	1.517	.84684	23.76649	.49318	507.6	1.384	.77584	21.77379	.61324
45	180	4.453	.557	525.1	1.434	.80258	22.52441	.56943	509.5	1.390	.77872	21.45883	.60857	464.4	1.254	.71134	19.96362	.71488
46	90	1.053	.132	428.6	1.158	.65497	18.3R161	.80162	370.6	.993	.56633	15.85932	.93913	350.1	.934	.53512	15.01811	.98893
47	90	2.053	.257	437.0	1.182	.66781	18.74203	.78190	380.2	1.020	.58099	16.30352	.91606	352.5	.941	.53879	15.12097	.98303
48	90	3.053	.382	432.2	1.169	.66047	18.53607	.79317	379.0	1.017	.57916	16.25398	.91893	351.3	.938	.53695	15.06954	.98598
49	90	4.053	.507	408.2	1.100	.62378	17.56269	.84959	363.4	.972	.55533	15.58530	.95656	342.9	.914	.52412	14.70952	.100676
50	270	1.053	.132	430.0	1.162	.65716	18.44315	.7925	508.3	1.386	.77686	21.80317	.61195	578.9	1.588	.88456	24.82522	.42230
51	270	2.053	.257	437.2	1.183	.66820	18.75312	.78130	511.9	1.397	.78241	21.95817	.60260	581.2	1.595	.88825	24.92866	.41496
52	270	3.053	.382	433.6	1.173	.66268	18.59814	.78978	504.7	1.376	.77136	21.64817	.62045	572.8	1.570	.87535	24.56662	.44029
53	270	4.053	.507	408.3	1.100	.62403	17.51324	.84921	469.8	1.276	.71797	20.14985	.70459	533.0	1.457	.81454	22.85989	.54937
54	0	4.931	.614	13.7	.027	.58791	3.17662	13.5	.028	.02070	.58107	3.18416	13.2	.029	.02022	.56740	3.20035	
55	0	5.456	.742	7.8	.044	.01194	.33474	3.56539	7.8	.044	.01194	.35639	11.7	.045	.01169	.32814	3.58104	
56	0	5.981	.746	7.2	.046	.01096	.37673	3.62706	7.2	.046	.01096	.37673	7.0	.047	.01072	.30079	3.64315	
57	0	6.506	.813	7.4	.046	.01072	.30379	3.64315	7.0	.047	.01072	.30379	3.64315	7.0				

TABLE VI.- TABULAR LISTING OF DATA\* FOR SHARP CONE;  $M_\infty = 4.63$  - Concluded(c)  $\alpha = 20^\circ$  - Concluded

Orifice $\theta$ , deg	s, in.	s/d	$\phi = 67.5^\circ$ , $p_t = 7924.4$ psf					$\phi = 90.0^\circ$ , $p_t = 7915.0$ psf					
			$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	$p_l$ , psf	$C_p$	$p_l/p_{t,2}$	$p_l/p_\infty$	$M_l$	
2	0	.253	.032	291.4	.766	.44532	12.49795	1.14023	.344.5	.919	.52717	14.79509	1.00180
3	0	.453	.057	327.4	.869	.50030	14.04090	1.04595	.384.1	1.033	.58779	16.49626	.90542
4	0	.653	.082	360.9	.965	.55161	15.48100	.96248	.415.4	1.122	.63555	17.83659	.83146
5	0	.853	.107	366.9	.982	.56078	15.73816	.94791	.422.6	1.143	.64657	18.14589	.81452
6	0	1.053	.132	369.1	.986	.56261	15.78959	.94501	.423.8	1.146	.64841	18.19744	.81170
7	0	1.253	.157	369.3	.989	.56444	15.86102	.94211	.425.0	1.149	.65024	18.24899	.80887
8	0	1.453	.182	374.1	1.003	.57177	16.04675	.93054	.431.0	1.167	.65943	18.50675	.79477
9	0	1.653	.207	375.3	1.006	.57360	16.09818	.92765	.432.2	1.170	.66126	18.55830	.79195
10	0	1.853	.232	376.5	1.010	.57544	16.14961	.92477	.433.4	1.174	.66310	18.60985	.78913
11	0	2.053	.257	377.7	1.013	.57727	16.20104	.92189	.433.4	1.174	.66310	18.60985	.78913
12	0	2.253	.282	378.9	1.016	.57910	16.25247	.91902	.434.6	1.177	.66494	18.66140	.78631
13	0	2.453	.307	380.1	1.020	.58094	16.30391	.91614	.435.8	1.180	.66677	18.71295	.78350
14	0	2.653	.332	380.1	1.020	.58094	16.30391	.91614	.434.6	1.177	.66494	18.66140	.78631
15	0	2.853	.357	378.9	1.016	.57910	16.25247	.91902	.433.4	1.174	.66310	18.60985	.78913
16	0	3.053	.382	378.9	1.016	.57910	16.25247	.91902	.432.2	1.170	.66126	18.55830	.79195
17	0	3.253	.407	378.5	1.010	.57544	16.14961	.92477	.428.6	1.160	.65575	18.40365	.80041
18	0	3.453	.432	375.3	1.006	.57360	16.09818	.92765	.426.2	1.153	.65208	18.30054	.80605
19	0	3.653	.457	372.9	.999	.56994	15.99532	.93343	.421.4	1.139	.64473	18.09434	.81734
20	0	3.853	.482	368.1	.986	.56261	15.78959	.94501	.415.4	1.122	.63555	17.83659	.83146
21	0	4.053	.507	364.5	.975	.55711	15.63529	.95373	.407.0	1.098	.62269	17.47573	.85127
22	0	4.253	.532	353.7	.944	.54062	15.17241	.98008	.390.1	1.050	.59697	16.75402	.89110
23	0	4.453	.557	335.8	.893	.51313	14.0093	1.02474	.364.9	.978	.55840	15.67145	.95168
24	180	.253	.032	471.5	1.281	.72055	20.22221	.70059	.383.0	1.029	.58607	16.44805	.90810
25	180	.453	.057	484.7	1.319	.74082	20.79112	.66893	.398.7	1.074	.61003	17.12046	.87083
26	180	.653	.082	494.4	1.346	.75556	21.20488	.64567	.414.3	1.119	.63399	17.79286	.83386
27	180	.853	.107	500.4	1.364	.76478	21.46347	.63100	.419.2	1.133	.64136	17.99975	.82252
28	180	1.053	.132	505.2	1.377	.77215	21.67035	.61918	.427.6	1.157	.65426	18.36182	.80270
29	180	1.253	.157	507.6	1.384	.77584	21.77379	.61324	.430.0	1.164	.65795	18.46526	.79704
30	180	1.453	.182	510.1	1.391	.77952	21.8723	.60728	.433.6	1.174	.66348	18.62044	.78856
31	180	1.653	.207	508.9	1.388	.77768	21.87255	.61026	.433.6	1.174	.66348	18.62044	.78856
32	180	1.853	.232	511.3	1.395	.78136	21.92895	.60429	.434.8	1.178	.66532	18.67216	.78573
33	180	2.053	.257	508.9	1.388	.77768	21.82551	.61026	.434.8	1.178	.66532	18.67216	.78573
34	180	2.253	.282	508.9	1.388	.77768	21.82551	.61026	.434.8	1.178	.66532	18.67216	.78573
35	180	2.453	.307	508.9	1.388	.77768	21.82551	.61026	.434.8	1.178	.66532	18.67216	.78573
36	180	2.653	.332	509.2	1.377	.77215	21.67035	.61918	.433.6	1.174	.66348	18.62044	.78856
37	180	2.853	.357	504.0	1.374	.77031	21.61863	.62214	.432.4	1.171	.66163	18.56871	.79138
38	180	3.053	.382	501.6	1.367	.76662	21.51519	.62005	.431.2	1.167	.65979	18.51699	.79421
39	180	3.253	.407	499.2	1.360	.76294	21.41175	.63394	.430.0	1.164	.65795	18.46526	.79704
40	180	3.453	.432	493.2	1.343	.75372	21.15316	.64859	.425.2	1.150	.65058	18.25837	.80836
41	180	3.653	.457	487.1	1.326	.74451	20.89456	.66314	.421.6	1.140	.64505	18.10320	.81685
42	180	3.853	.482	478.7	1.302	.73161	20.53253	.68336	.415.5	1.123	.63583	17.84458	.83102
43	180	4.053	.507	467.9	1.271	.71502	20.06705	.70917	.407.1	1.098	.62293	17.48252	.85090
44	180	4.253	.532	444.9	1.205	.68001	19.08439	.76317	.391.5	1.054	.59897	16.81012	.88799
45	180	4.453	.557	410.0	1.105	.62657	17.58453	.84529	.363.7	.974	.55658	15.62048	.95457
46	90	1.053	.132	352.5	.941	.53879	15.12097	.98303	.357.7	.957	.54738	15.36215	.96924
47	90	2.053	.257	347.7	.927	.53145	14.91525	.99486	.349.3	.933	.53452	15.00129	.98990
48	90	3.053	.382	345.3	.920	.52779	14.81238	1.00080	.348.1	.930	.53268	14.94974	.99287
49	90	4.053	.507	340.5	.907	.52046	14.60665	1.01273	.344.5	.919	.52717	14.79509	1.00180
50	270	1.053	.132	629.4	1.732	.96196	26.99743	.23602	.650.4	1.795	.99522	27.93065	.08280
51	270	2.053	.257	631.8	1.739	.96865	27.10087	.22402	.651.6	1.798	.99706	27.98238	.06489
52	270	3.053	.382	619.8	1.705	.94722	26.58367	.27940	.638.4	1.760	.97879	27.41342	.18349
53	270	4.053	.507	578.8	1.588	.88456	24.82522	.62230	.598.6	1.646	.91597	25.70655	.35634
54	0	4.931	.616	13.1	.029	.01997	.56056	3.20860	.13.2	.029	.02020	.56683	3.20103
55	0	5.456	.682	7.5	.045	.01145	.32130	.3.59602	.7.8	.044	.01192	.33463	3.56711
56	0	5.981	.748	7.0	.047	.01072	.30079	.3.64315	.7.3	.046	.01119	.31415	3.61208
57	0	6.506	.813	6.9	.047	.01047	.29395	.3.65964	.7.2	.046	.01095	.30732	3.62778
58	0	7.031	.879	7.0	.047	.01072	.30079	.3.64315	.7.3	.046	.01119	.31415	3.61208
59	180	7.031	.879	6.9	.047	.01047	.29395	.3.65964	.7.2	.046	.01095	.30732	3.62778
60	180	6.506	.813	6.9	.047	.01047	.29395	.3.65964	.7.2	.046	.01095	.30732	3.62778
61	180	5.981	.748	6.9	.047	.01047	.29395	.3.65964	.7.2	.046	.01095	.30732	3.62778
62	180	5.456	.682	6.9	.047	.01047	.29395	.3.65964	.7.2	.046	.01095	.30732	3.62778
63	180	4.931	.616	6.9	.047	.01047	.29395	.3.65964	.7.2	.046	.01095	.30732	3.62778

\*The following conversion factors can be used to convert these data to the International System of Units:

$$1 \text{ inch} = 25.4 \text{ mm}; 1 \text{ psf} = 47.88 \text{ N/m}^2.$$

Orifice number	$\theta$ , deg	s/d for -		Orifice number	$\theta$ , deg	s/d for -	
		Blunt cone	Sharp cone			Blunt cone	Sharp cone
1	0	0.000	0.032	33	180	0.250	0.257
2		.025	.057	34		.275	.282
3		.050	.082	35		.300	.307
4		.075	.107	36		.325	.332
5		.100	.132	37		.350	.357
6		.125	.157	38		.375	.382
7		.150	.182	39		.400	.407
8		.175	.207	40		.425	.432
9		.200	.232	41		.450	.457
10		.225	.257	42		.475	.482
11		.250	.282	43		.500	.507
12		.275	.307	44		.525	.532
13		.300	.332	45		.550	.557
14		.325	.357	46	90	.125	.132
15		.350	.382	47		.250	.257
16		.375	.407	48		.375	.382
17		.400	.432	49		.500	.507
18		.425	.457	50	270	.125	.132
19		.450	.482	51		.250	.257
20		.475	.507	52		.375	.382
21		.500	.532	53		.500	.507
22		.525	.557	54 <sup>a</sup>	0	.610	.616
23		.550	.582	55 <sup>a</sup>		.675	.682
24	180	.025	.057	56 <sup>a</sup>		.741	.748
25		.050	.082	57 <sup>a</sup>		.807	.813
26		.075	.107	58 <sup>a</sup>		.872	.879
27		.100	.132	59 <sup>a</sup>	180	.872	.879
28		.125	.157	60 <sup>a</sup>		.807	.813
29		.150	.182	61 <sup>a</sup>		.741	.748
30		.175	.207	62 <sup>a</sup>		.675	.682
31		.200	.232	63 <sup>a</sup>		.610	.616
32		.225					

<sup>a</sup>Orifices located on model base

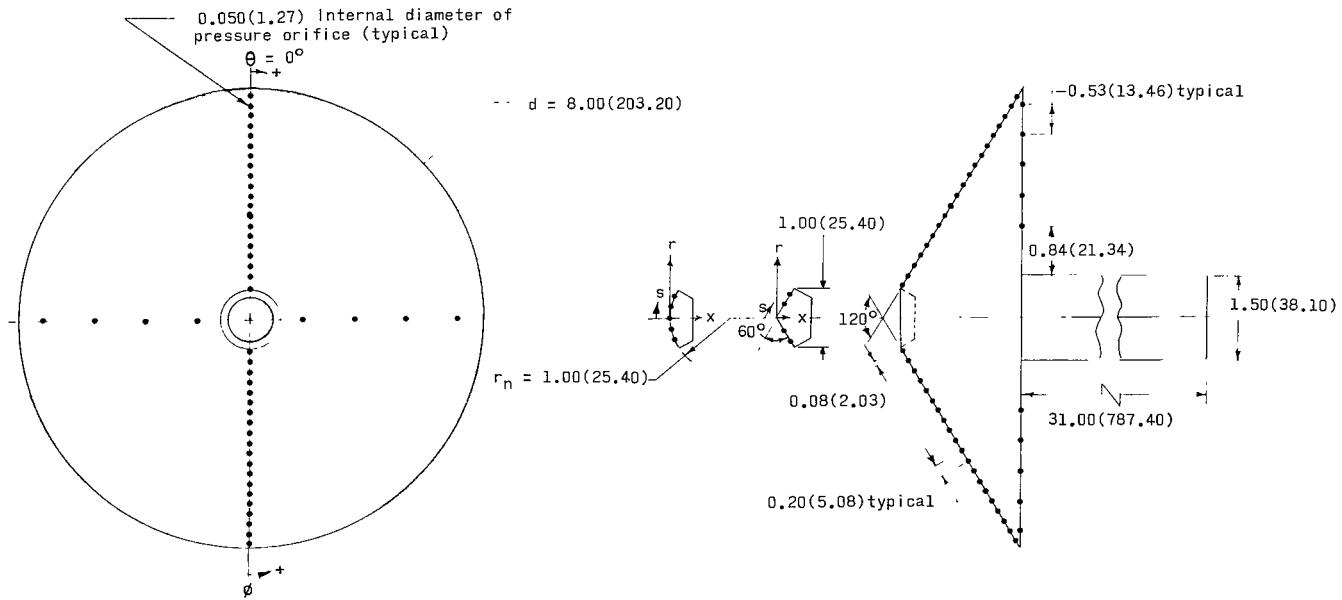


Figure 1.- Model dimensions and pressure orifice locations. Dimensions are in inches (millimeters).

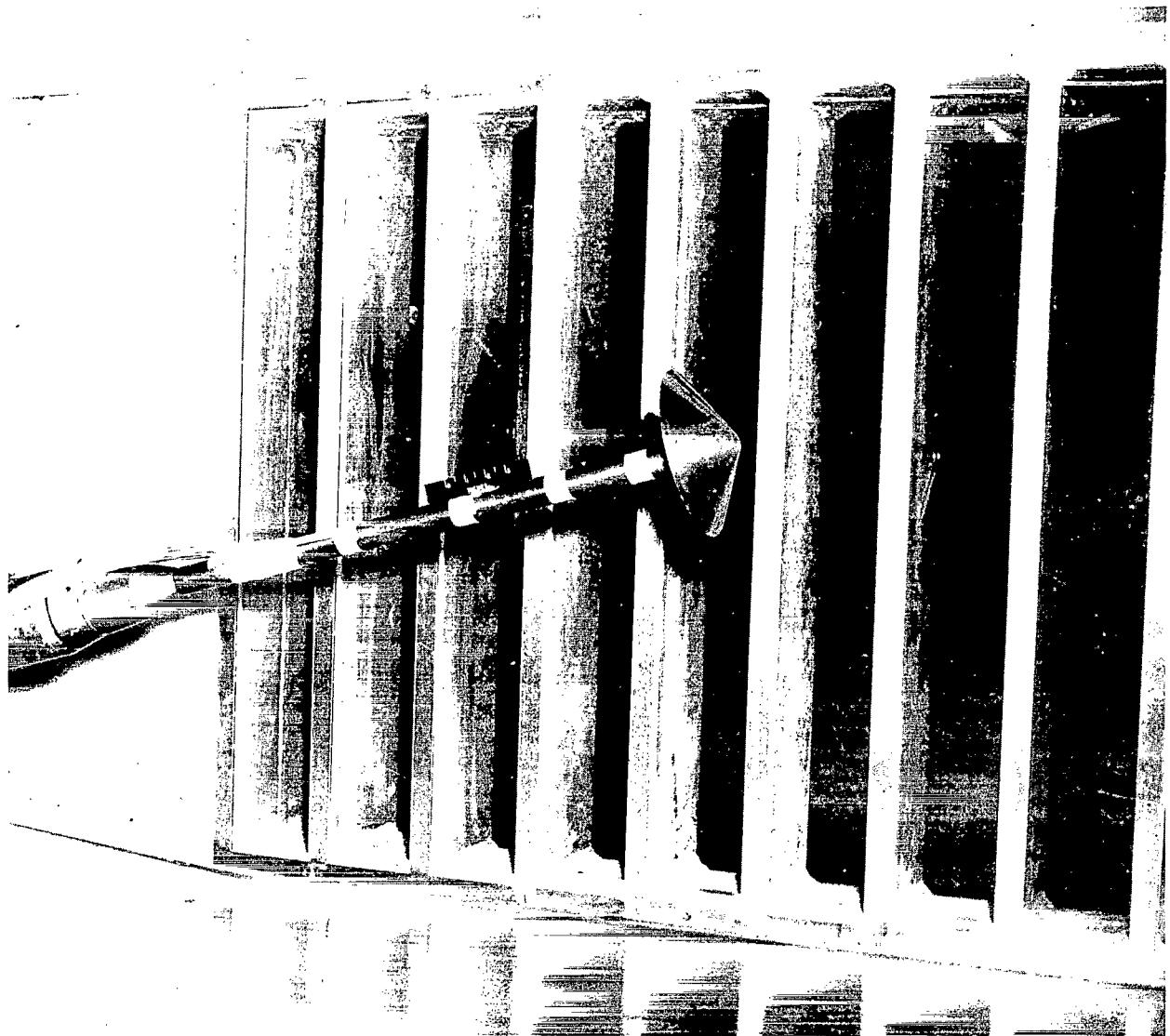


Figure 2.- Typical model installation in test section.

L-68-10,065

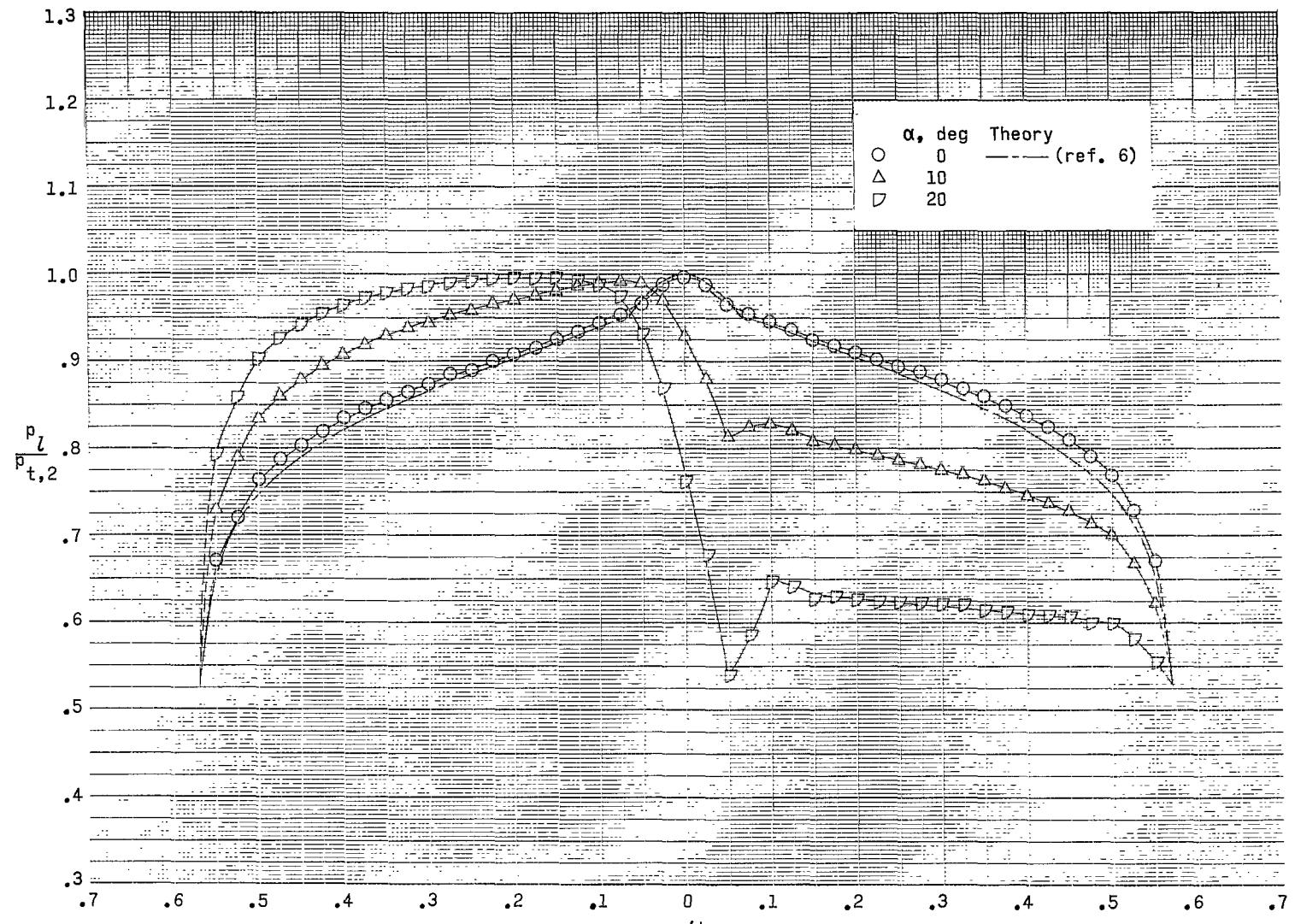
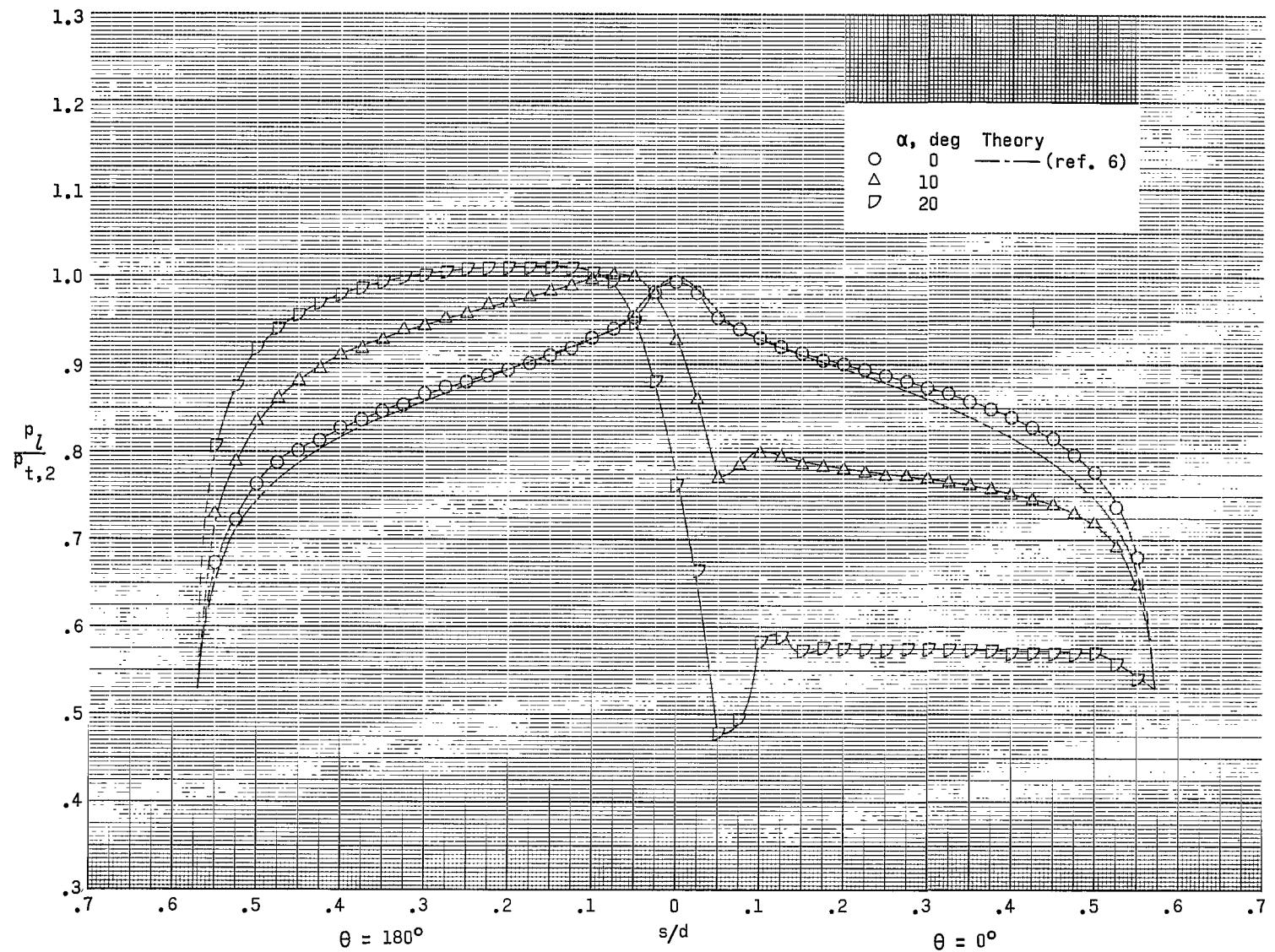
(a)  $M_\infty = 2.96$ .

Figure 3.- Effect of angle of attack on pressure distributions for the blunt cone.  $\phi = 0^\circ$ .



(b)  $M_\infty = 3.95$ .

Figure 3.- Continued.

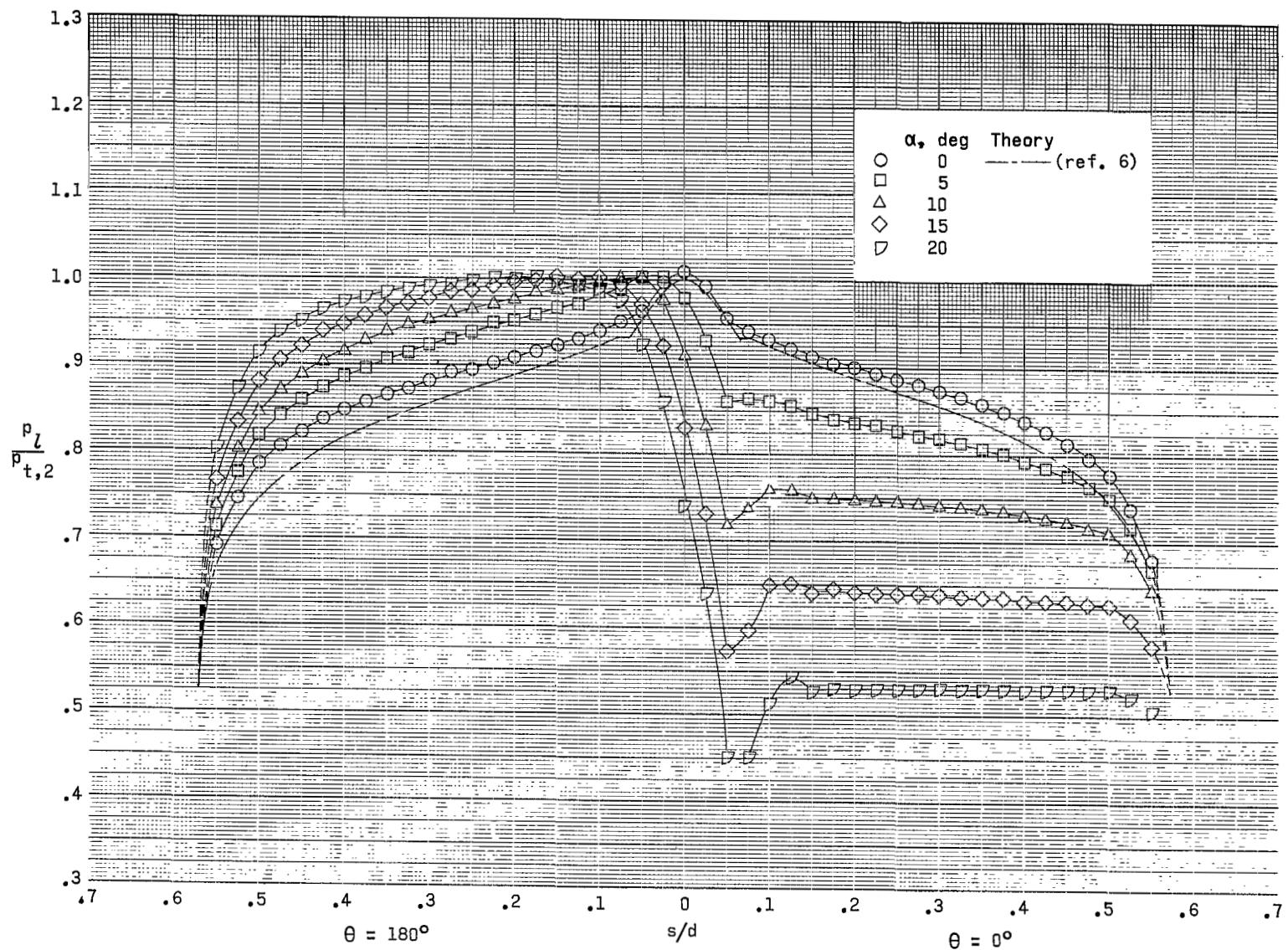
(c)  $M_\infty = 4.63$ .

Figure 3.- Concluded.

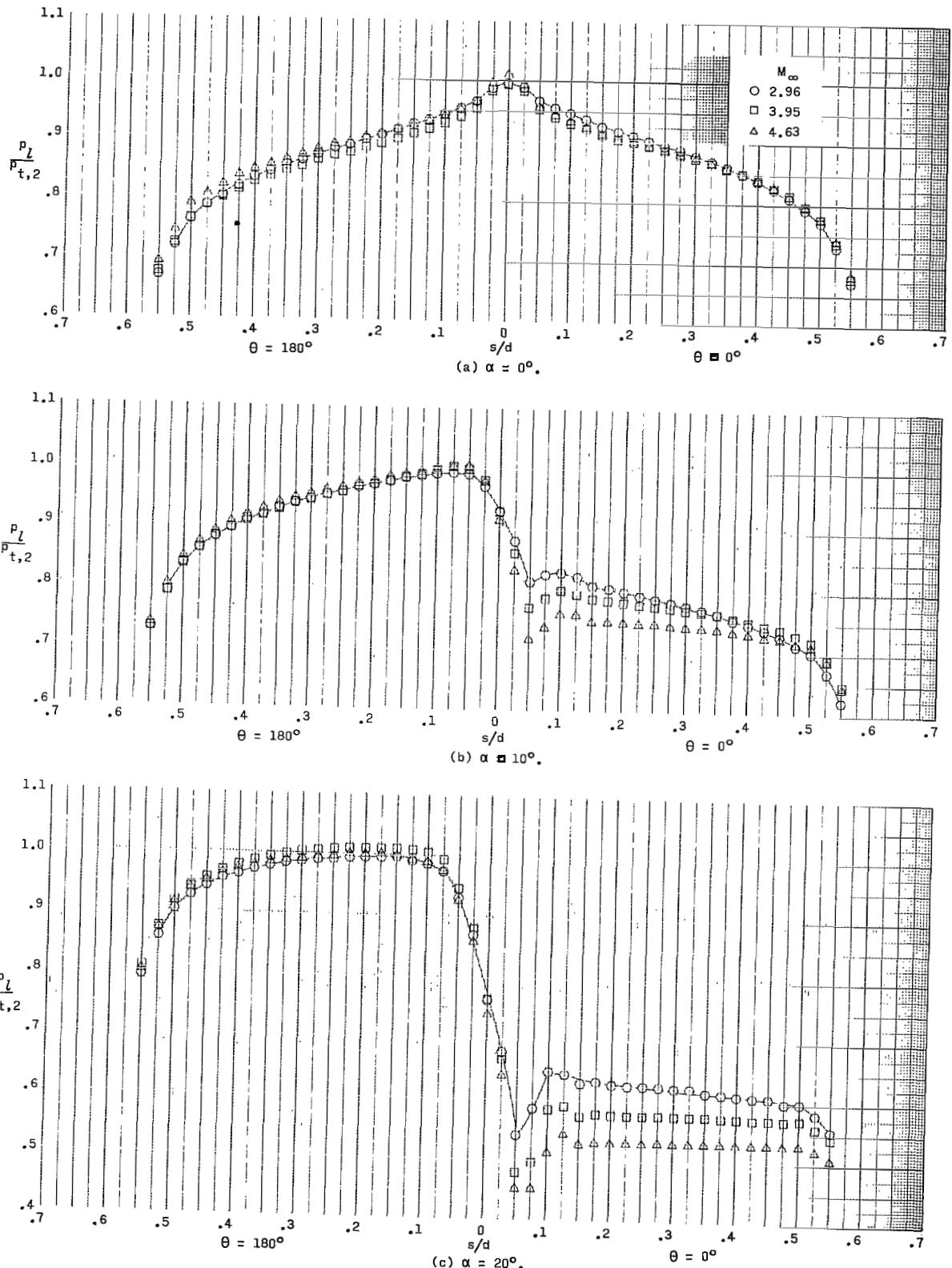


Figure 4.- Effect of Mach number on pressure distributions for the blunt cone,  $\phi = 0^\circ$ .

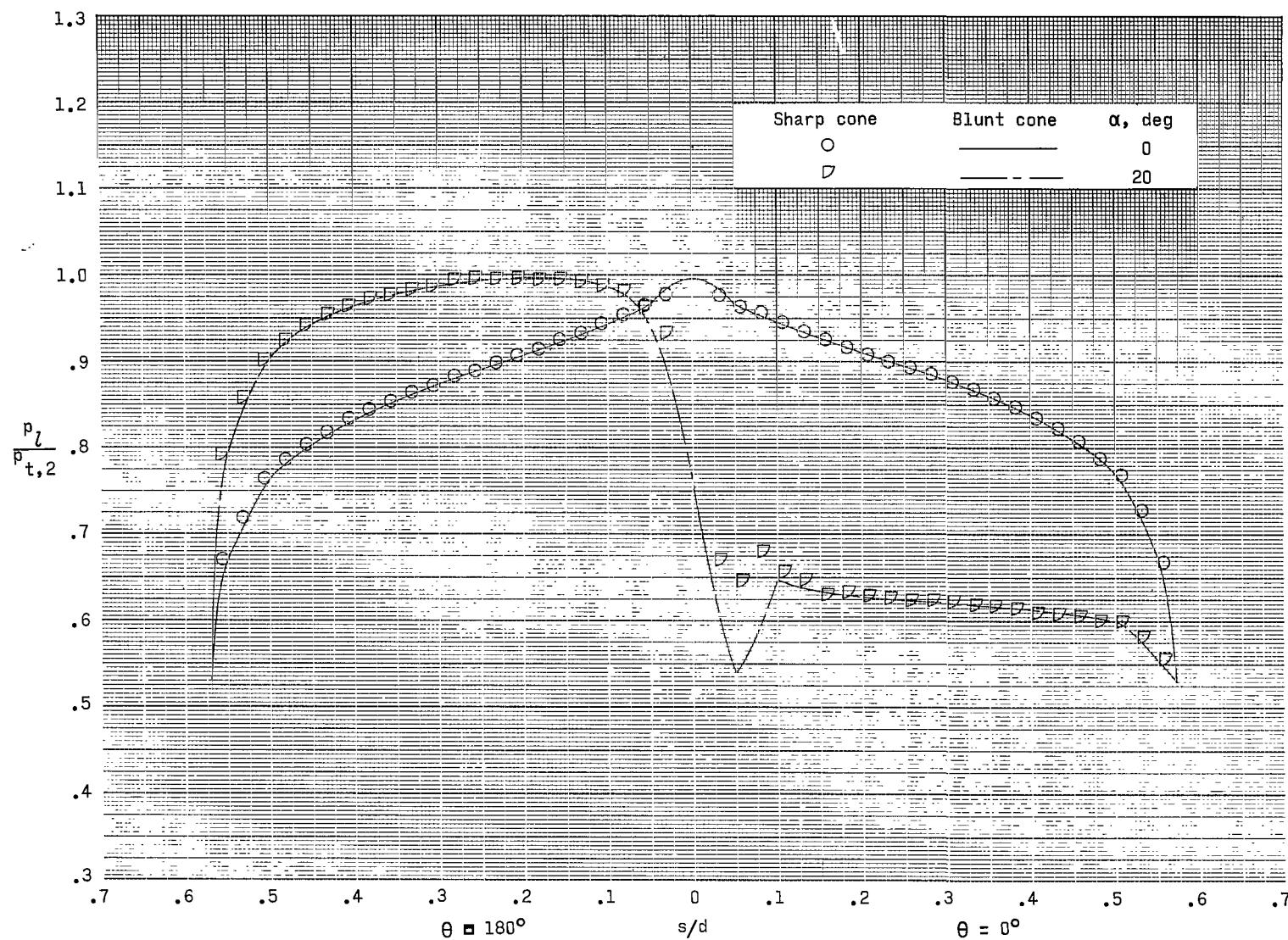
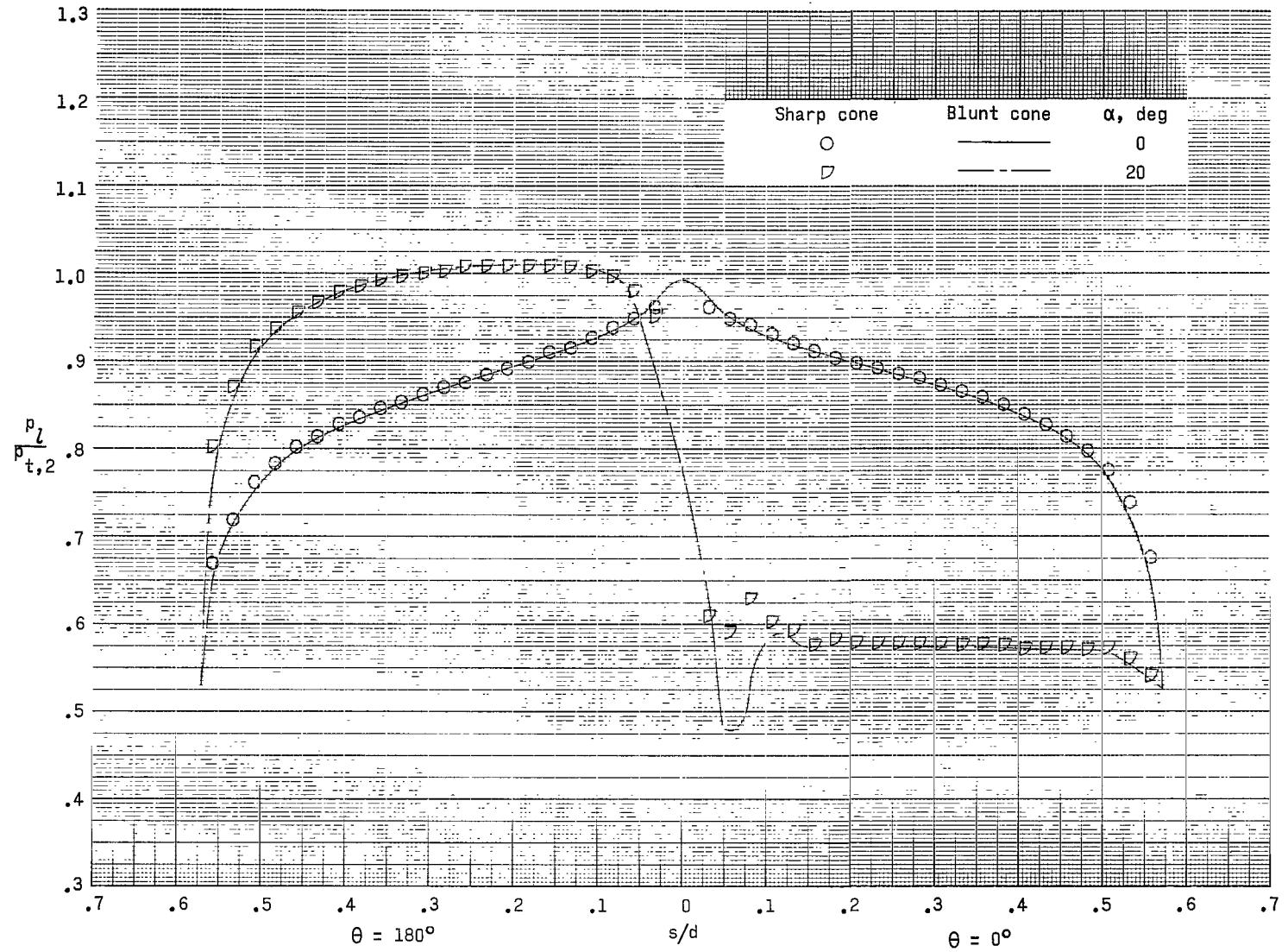
(a)  $M_\infty = 2.96$ .

Figure 5.- Comparison of pressure distributions for the blunt cone with those for the sharp cone.  $\phi = 0^\circ$ .



(b)  $M_\infty = 3.95$ .

Figure 5.- Continued.

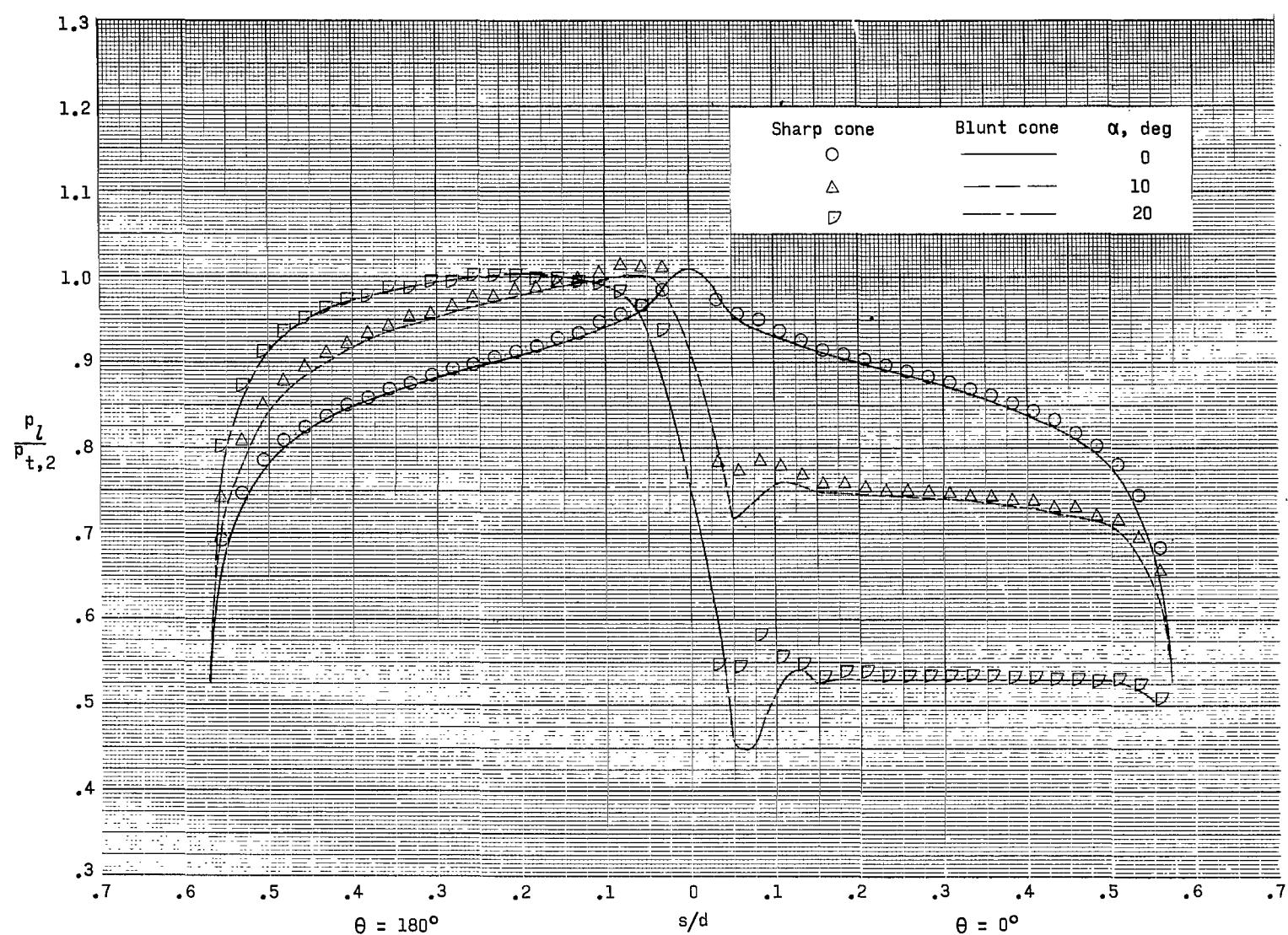
(c)  $M_\infty = 4.63$ .

Figure 5.- Concluded.

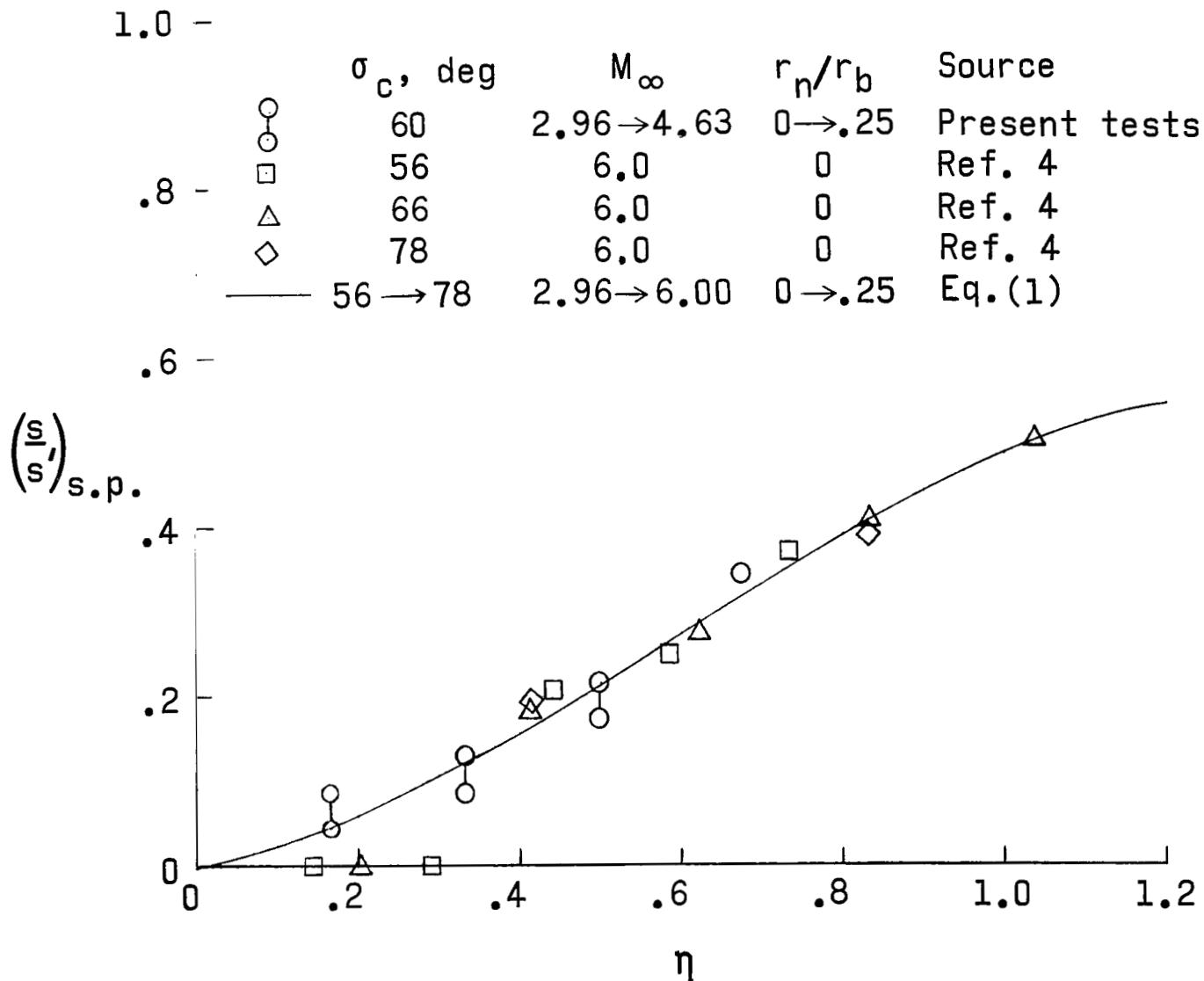


Figure 6.- Correlation of stagnation-point locations at angles of attack.

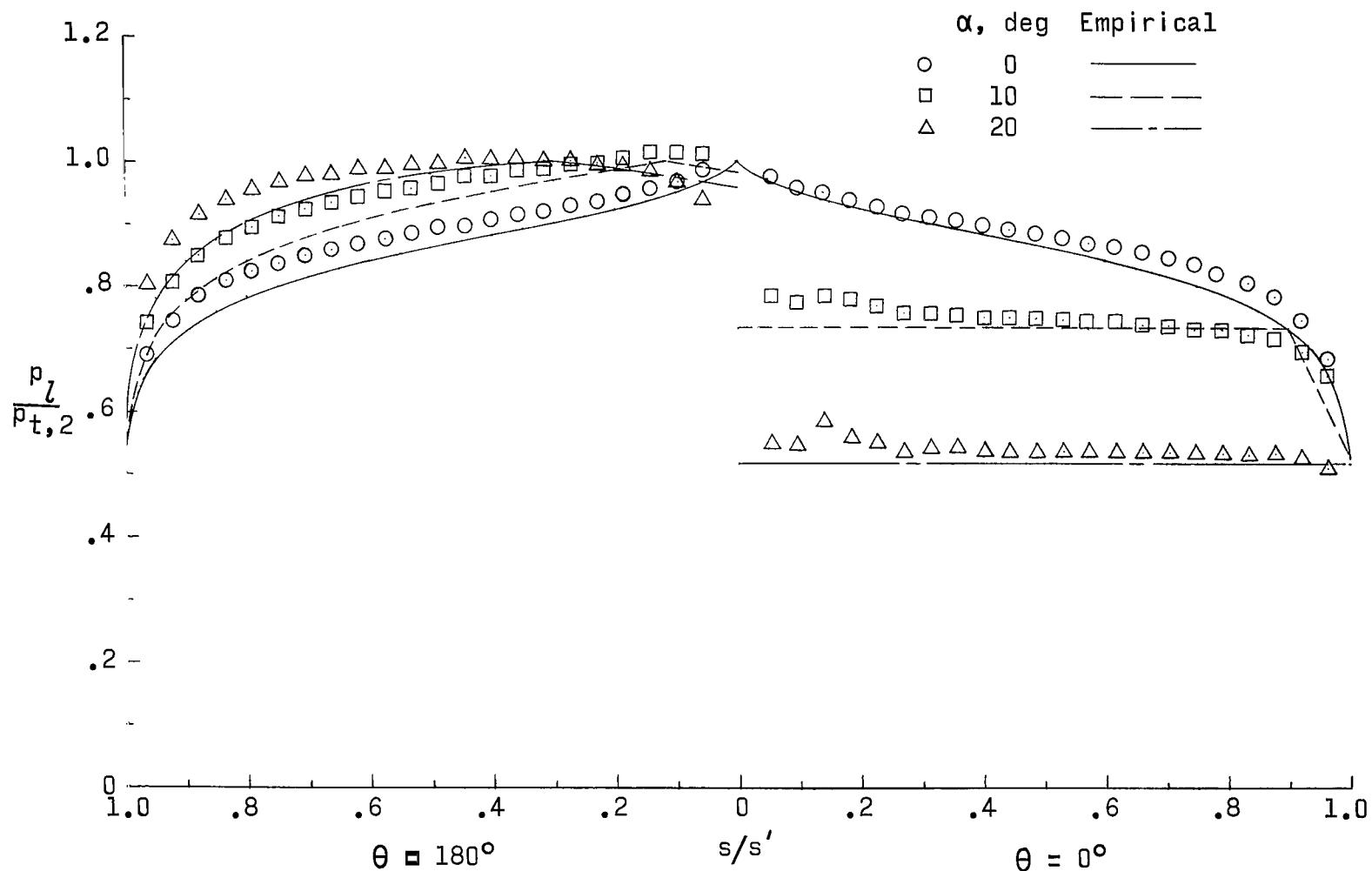
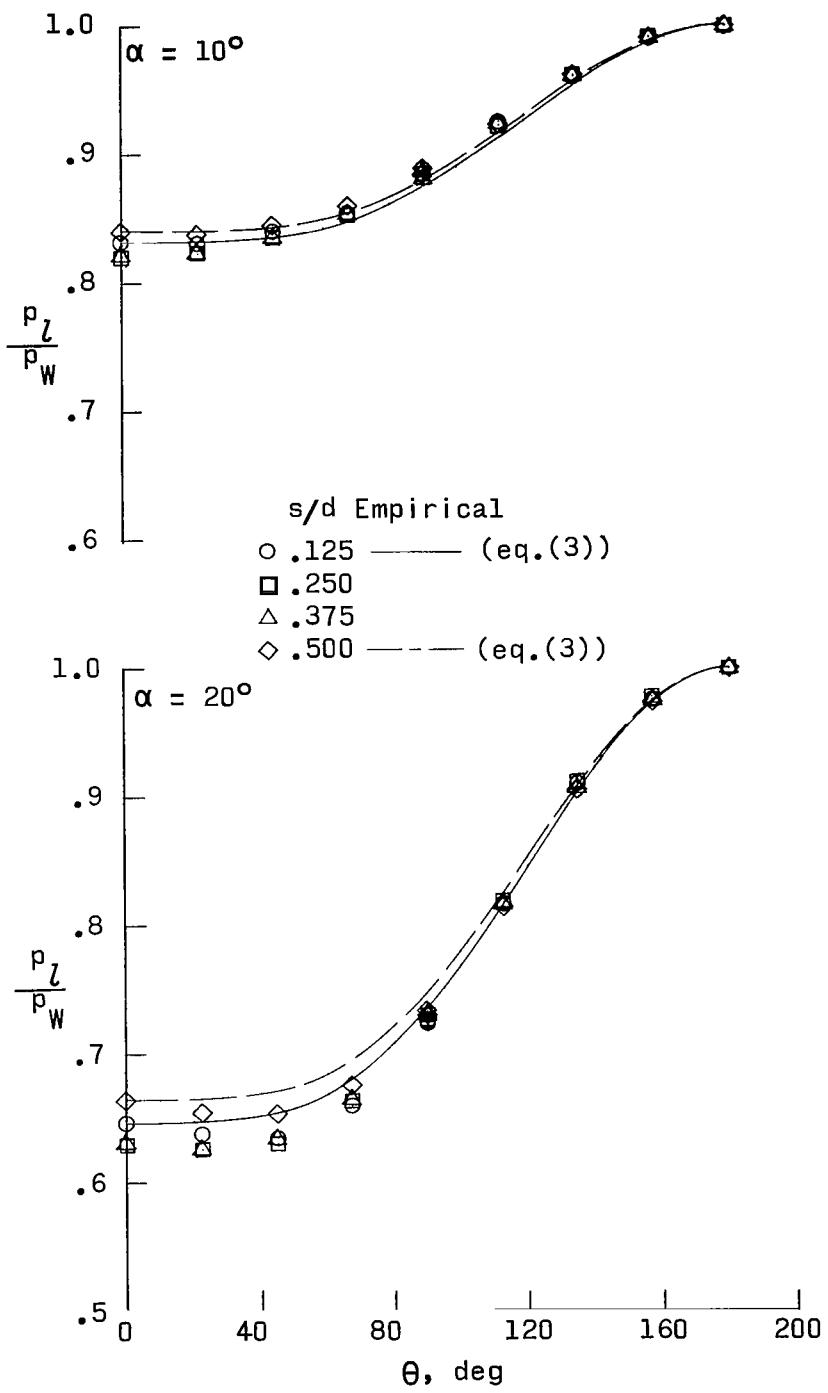
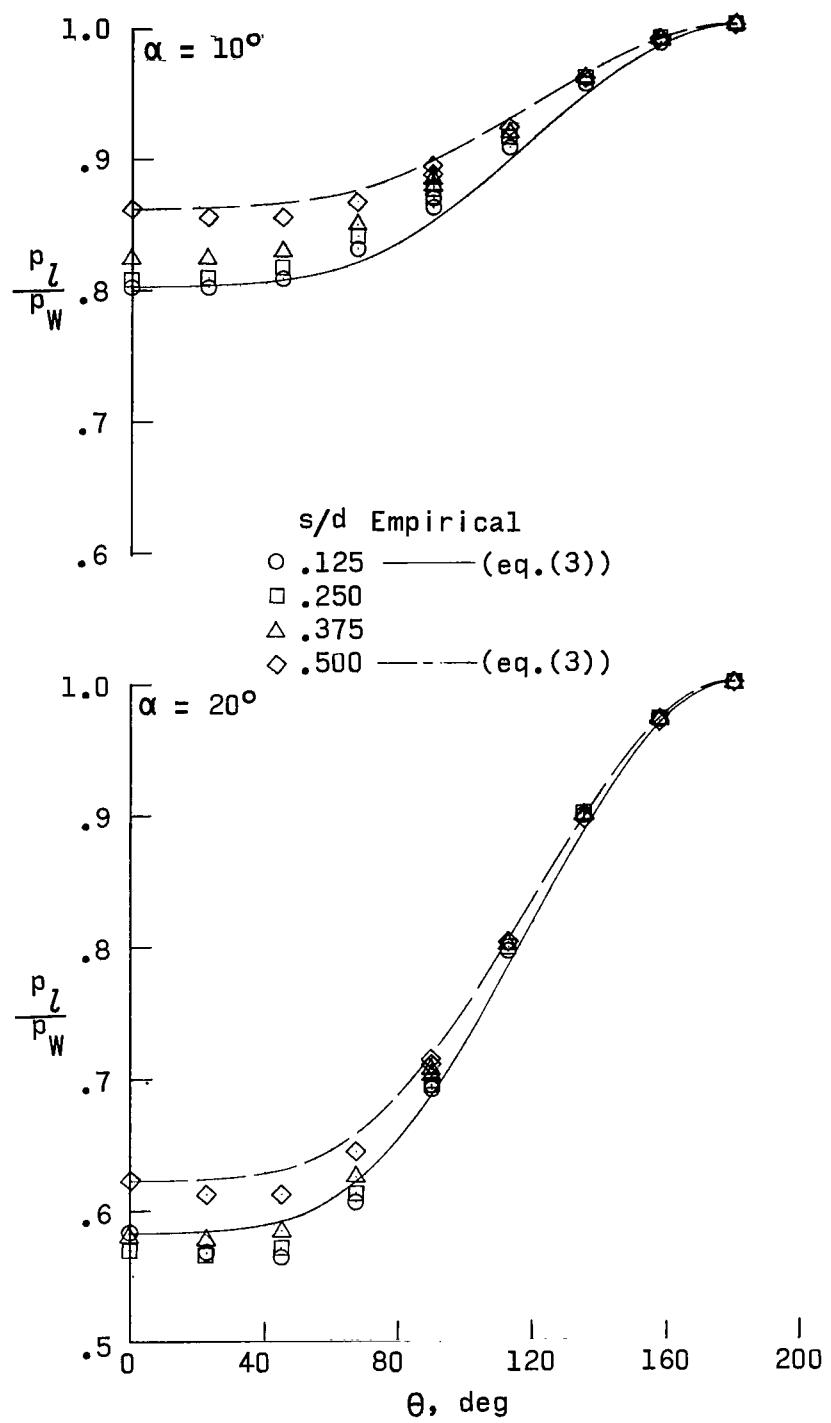


Figure 7.- Comparison of measured and empirical pressure distributions for the sharp cone.  $M_\infty = 4.63$ .



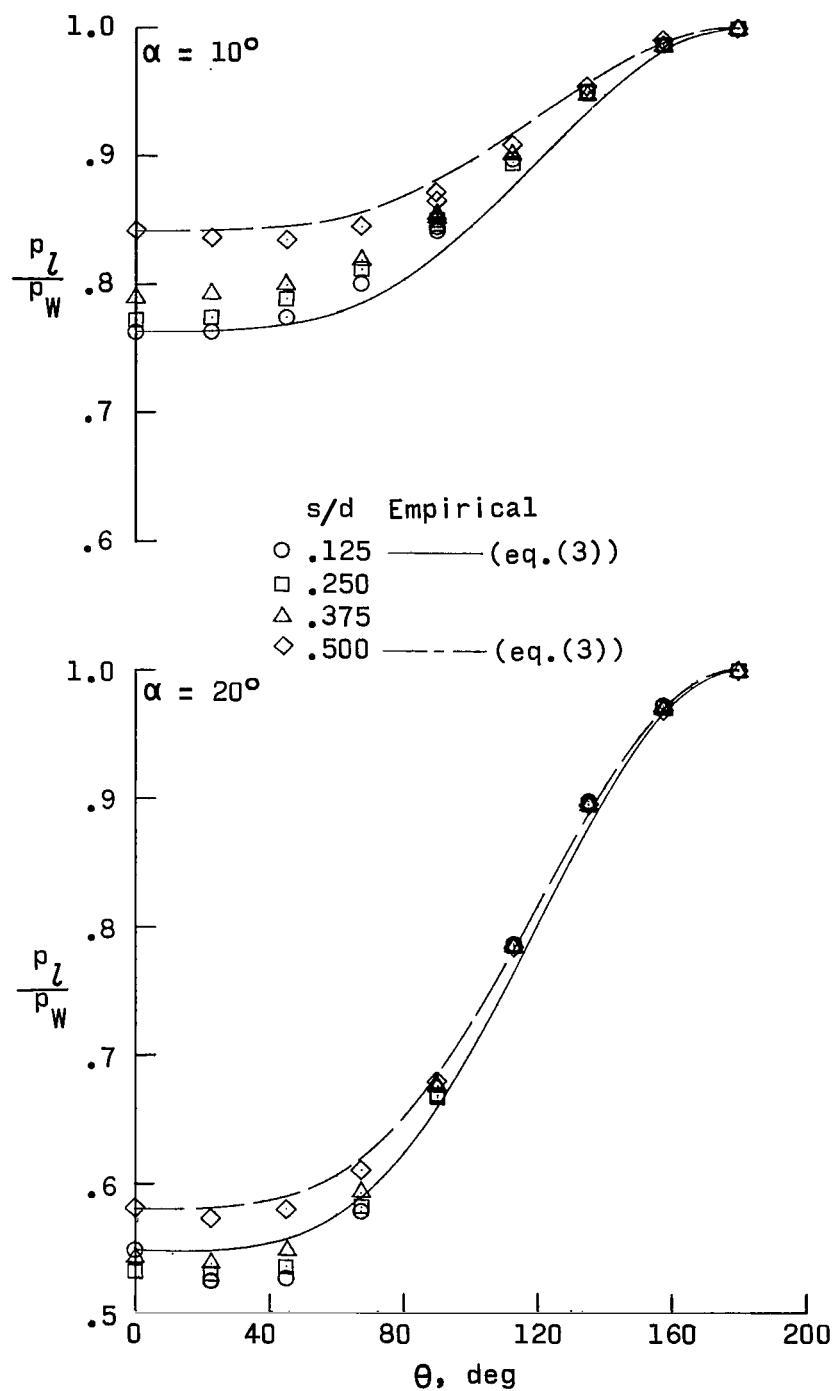
(a)  $M_\infty = 2.96$ .

Figure 8.- Circumferential pressure distributions at angles of attack for the blunt cone.



(b)  $M_\infty = 3.95$ .

Figure 8.- Continued.



(c)  $M_\infty = 4.63$ .

Figure 8.- Concluded.

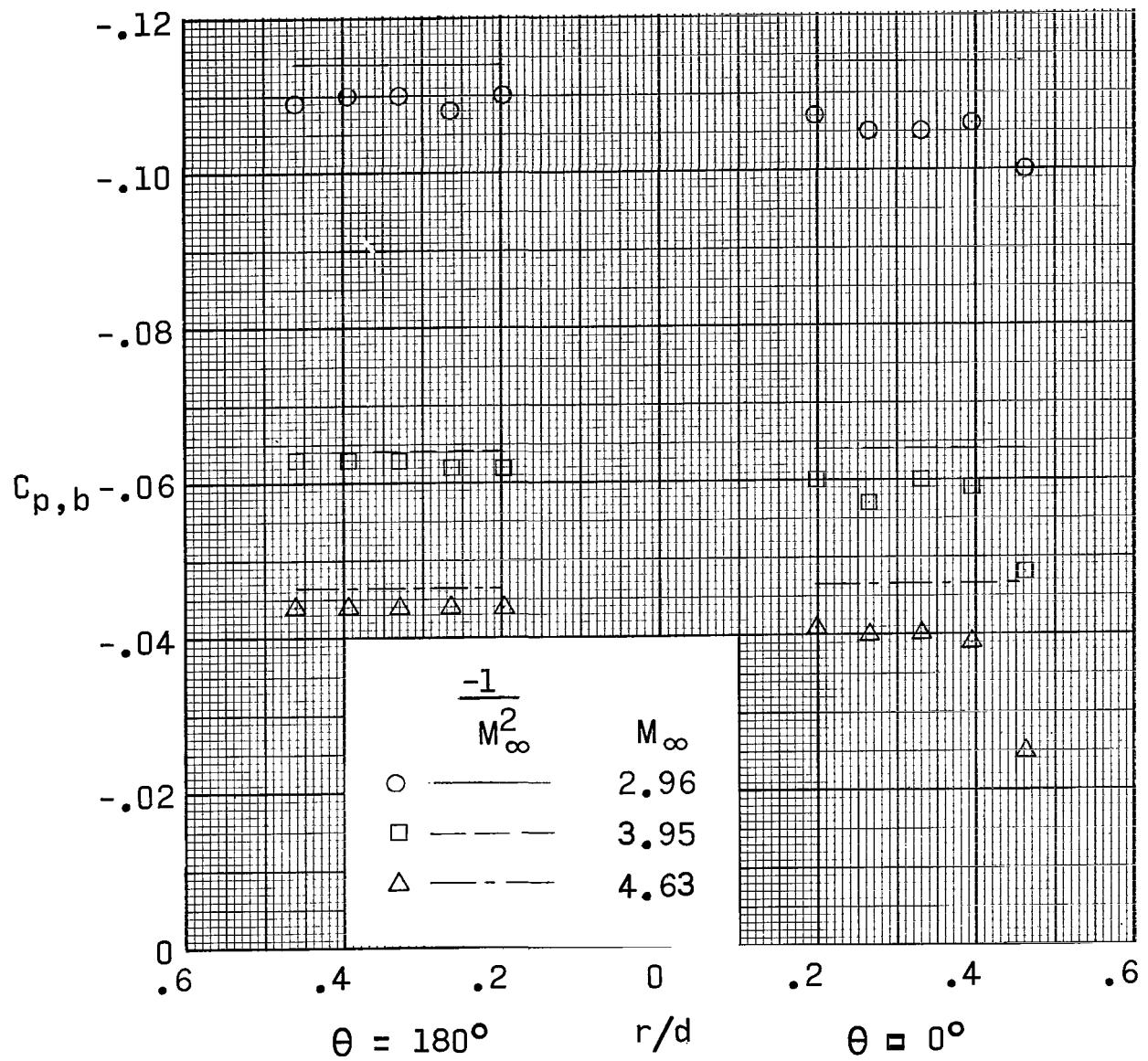


Figure 9.- Effect of Mach number on base pressure coefficients for the blunt cone.  $\alpha = 0^\circ$ ;  $\phi = 0^\circ$ .

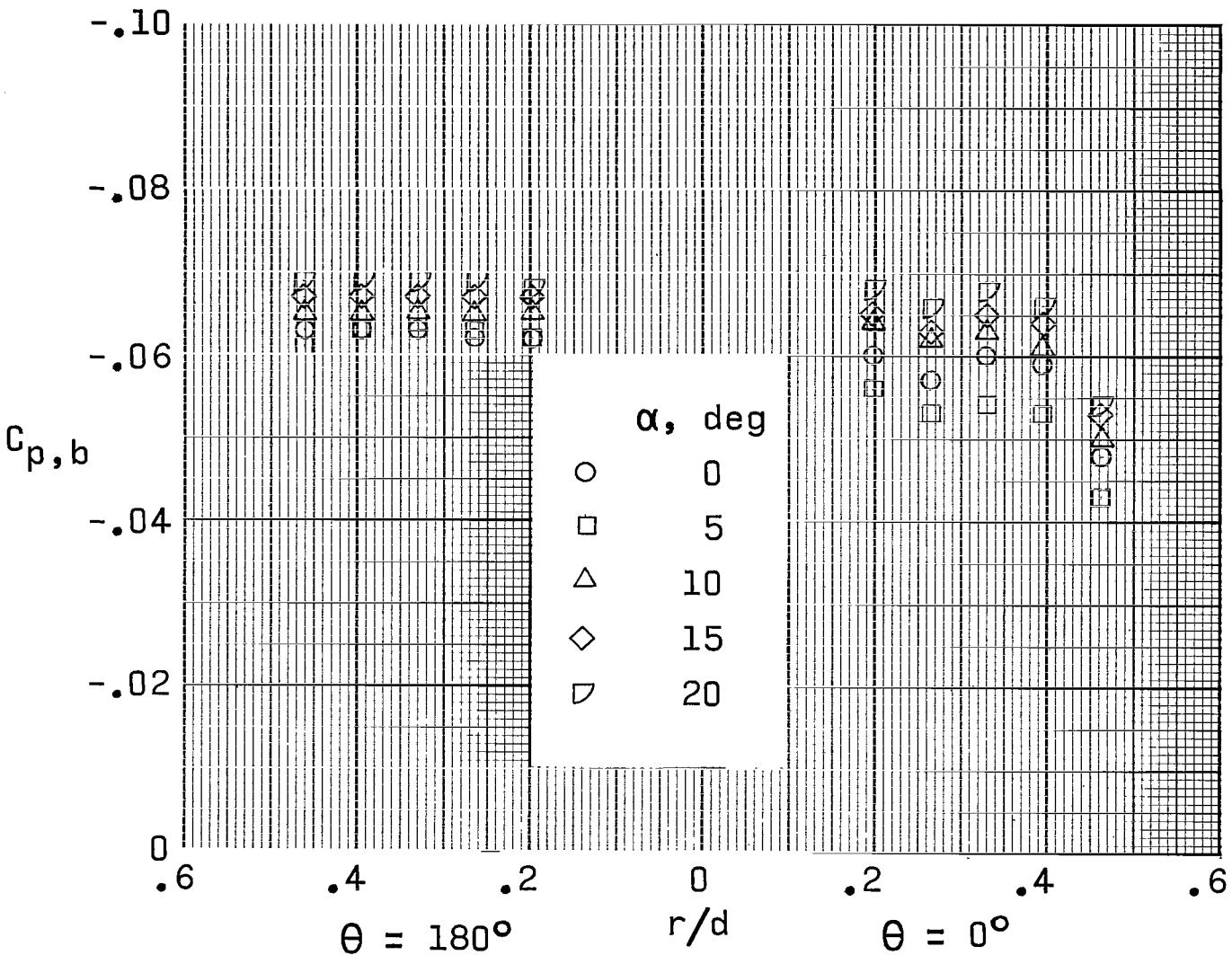


Figure 10.- Effect of angle of attack on base pressure coefficients for the blunt cone.  $M_\infty = 3.95$ ;  $\phi = 0^0$ .

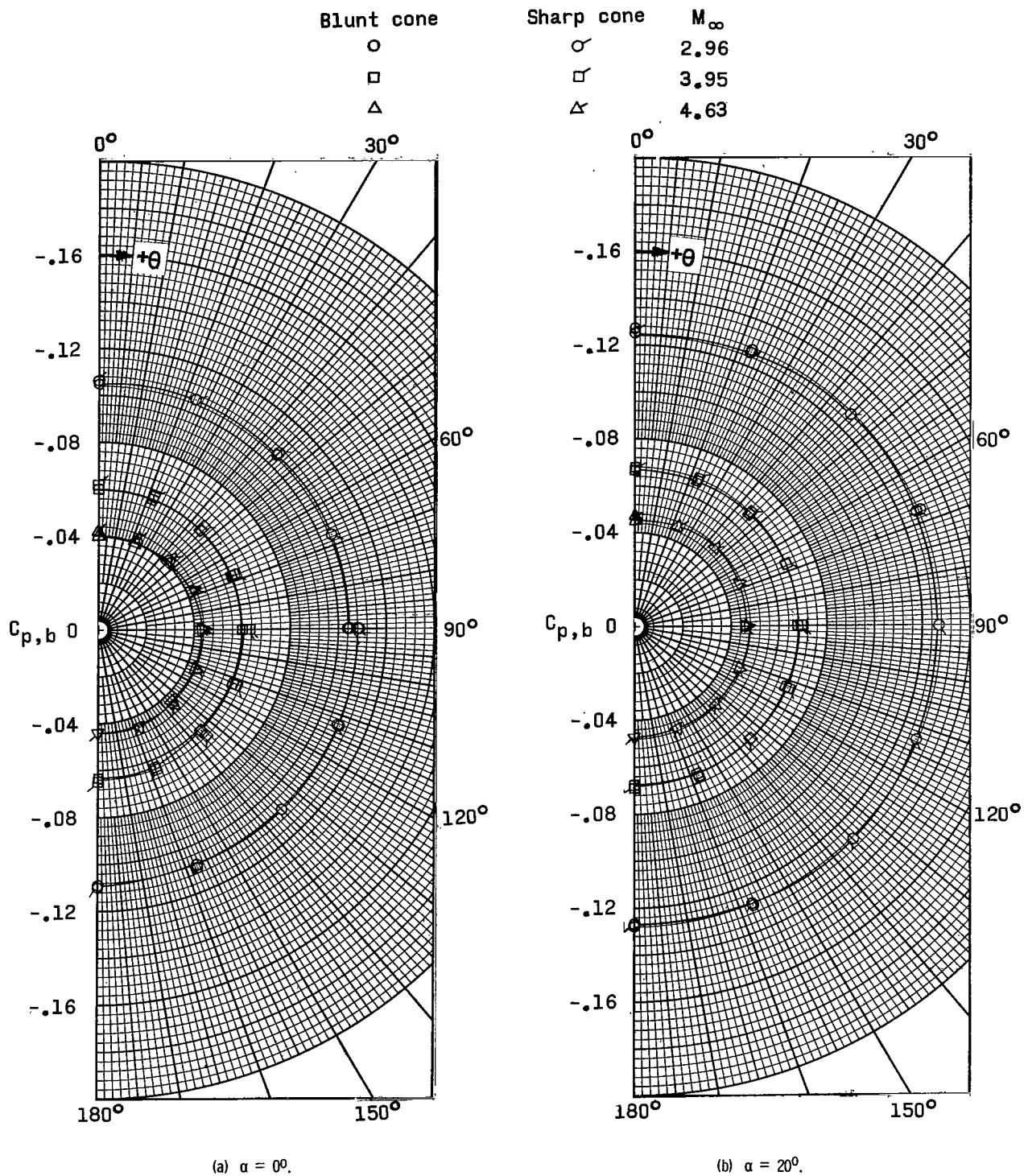
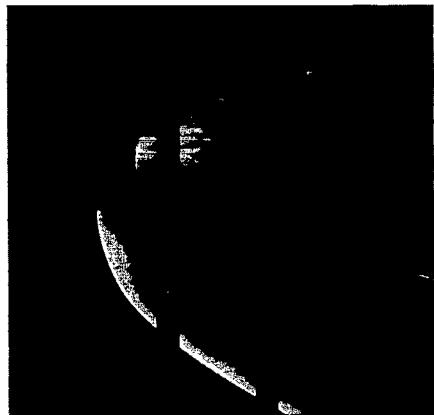


Figure 11.- Effect of nose bluntness and Mach number on circumferential distributions of base pressure coefficients.  $r/d = 0.33$ .



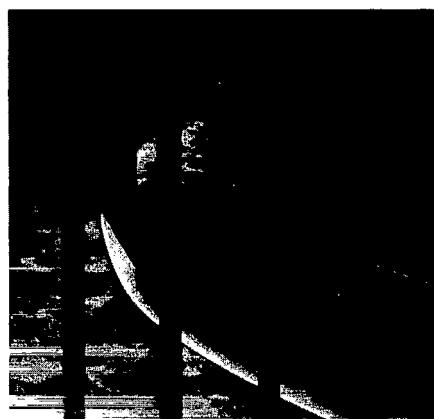
$M_{\infty} = 2.96$



$M_{\infty} = 2.96$



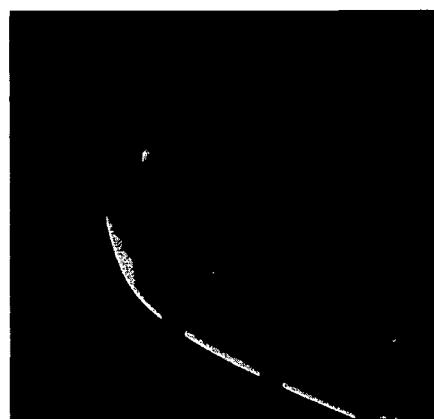
$M_{\infty} = 3.95$



$M_{\infty} = 3.95$



$M_{\infty} = 4.63$



$M_{\infty} = 4.63$

(a) Blunt cone.

(b) Sharp cone. L-68-10,066

Figure 12.- Effect of Mach number on shock shape.  $\alpha = 0^{\circ}$ .

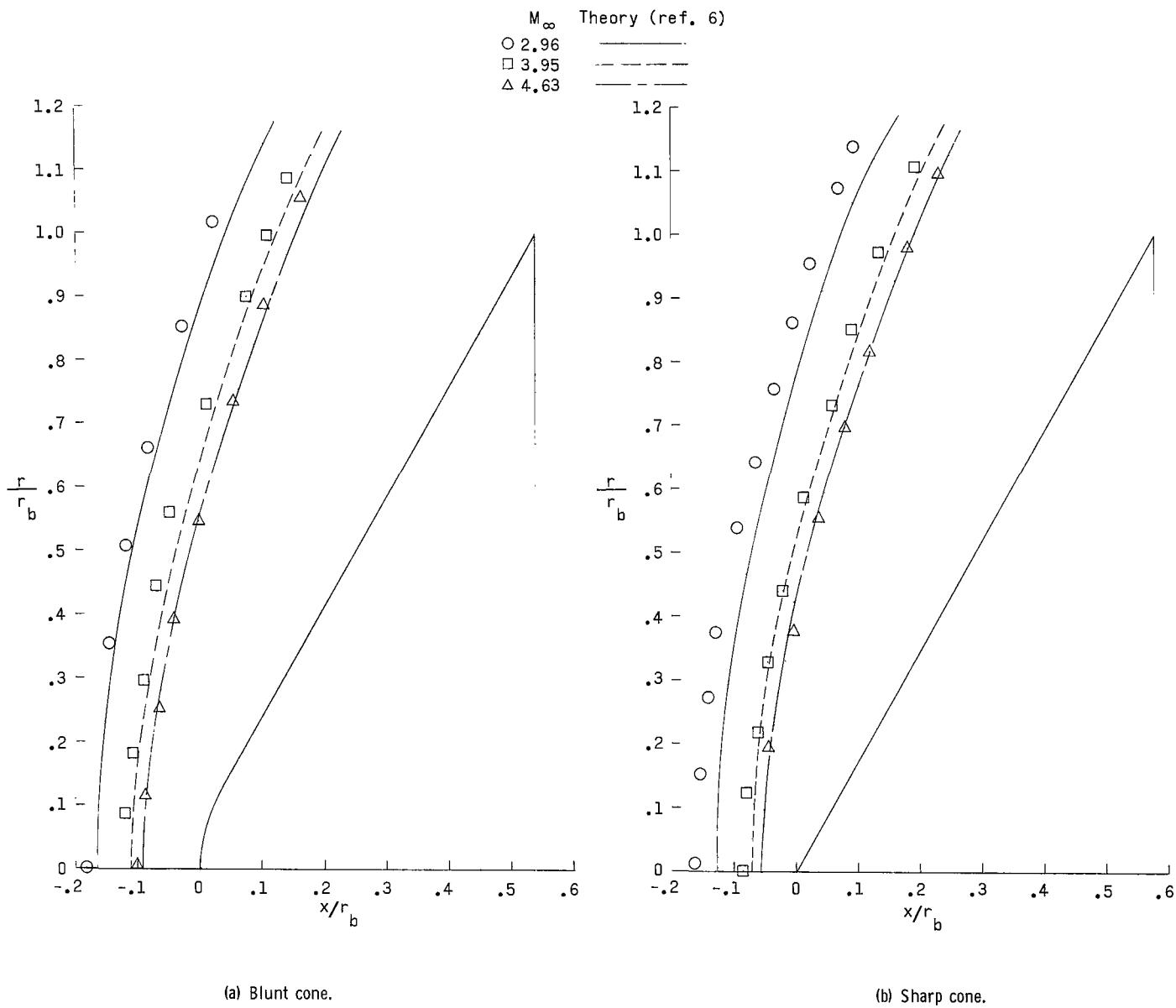
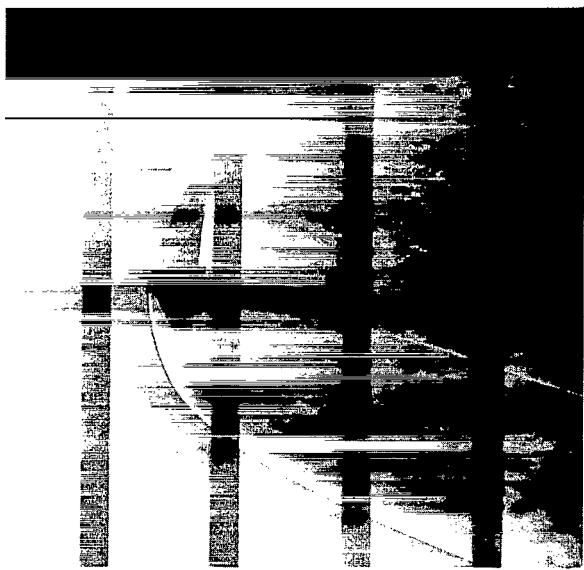


Figure 13.- Comparison of experimental and theoretically determined shock shapes.  $\alpha = 0^\circ$ .



$\alpha = 5^\circ$



$\alpha = 10^\circ$



$\alpha = 15^\circ$



$\alpha = 20^\circ$

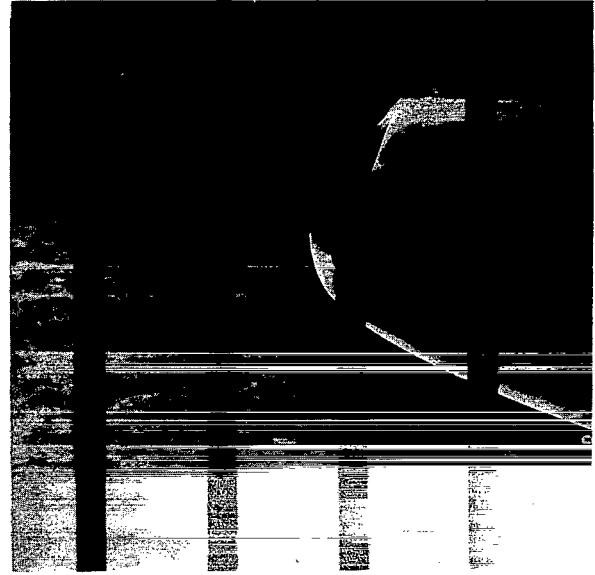
(a) Blunt cone.

L-68-10,067

Figure 14.- Effect of angle of attack on shock shape.  $M_\infty = 4.63$ .



$$\alpha = 10^\circ$$



$$\alpha = 20^\circ$$

(b) Sharp cone.

L-68-10,068

Figure 14.- Concluded.

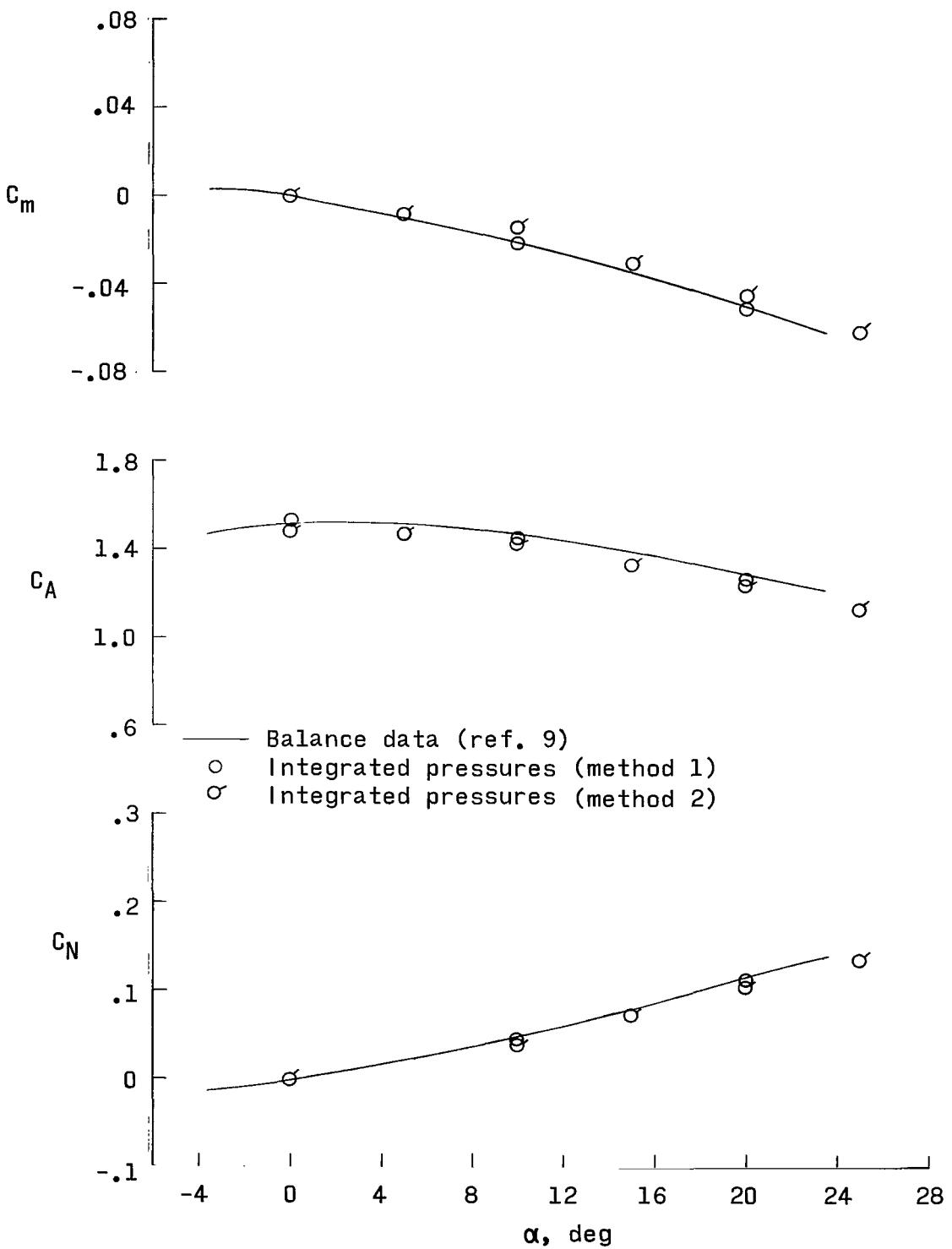


Figure 15.- Comparison of analytical and experimental force coefficients for the sharp cone.  $M_\infty = 4.63$ ;  $\alpha_C = 60^\circ$ .

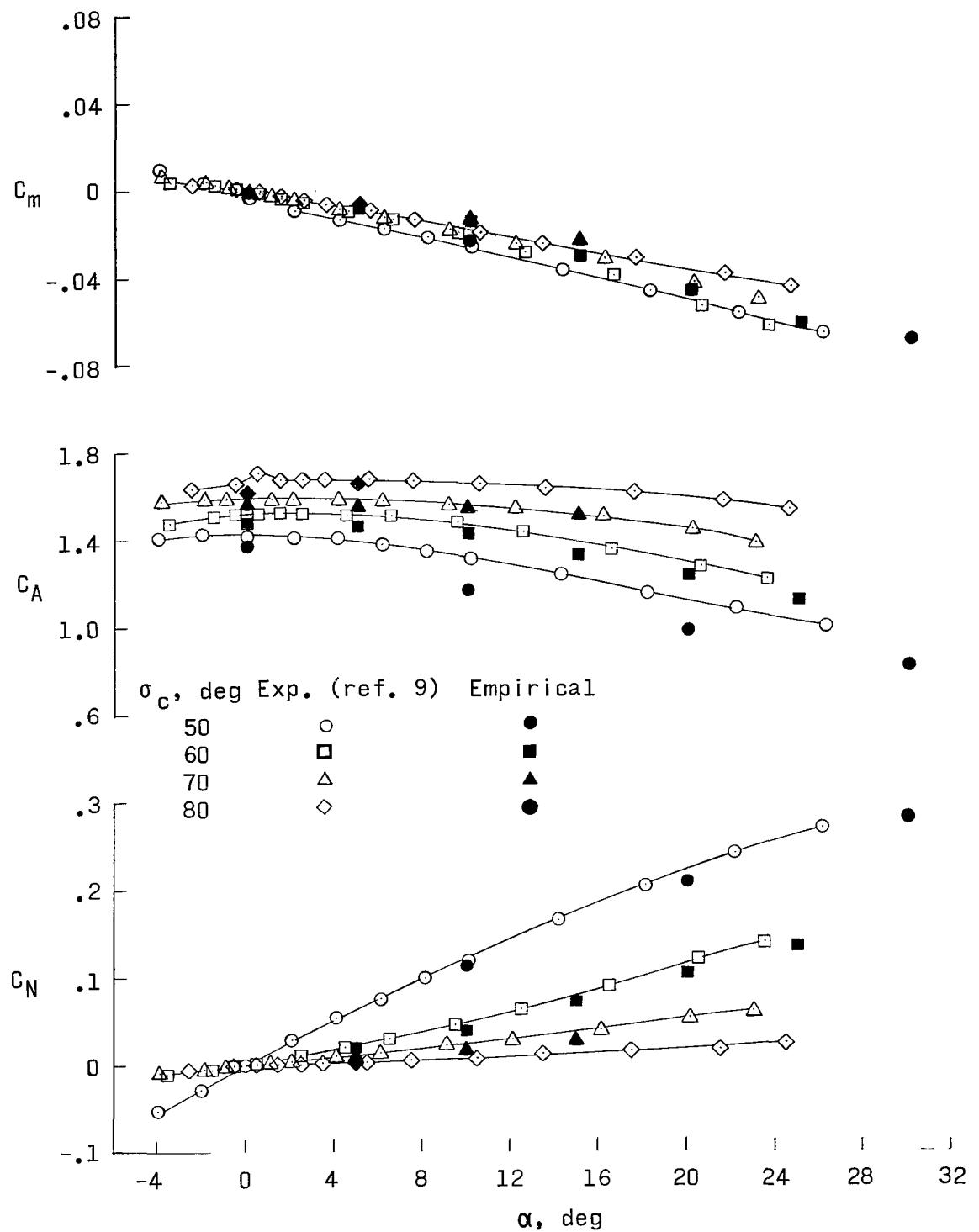


Figure 16.- Comparison of force coefficients evaluated from all-empirical pressure distributions with balance measurements for sharp cones.  $M_\infty = 4.63$ .

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